CONSTRUCTION CONTRACT

New York City
Department of
Environmental Protection
59-17 Junction Boulevard
Flushing, New York 11373

Lisa F. Garcia
Commissioner

Joseph Vaicels
Assistant Commissioner
Agency Chief Contracting Officer

Invitation for Bids for Furnishing all Labor and Material Necessary and Required for:

Contract: **CAT-475**

Description: **High Level Outlet (HLO) Installation at Gilboa Dam and Crest Gate Removal**

Volume 2 of 2
Contract Terms and Specifications
(with separate Bid Booklet)



August 2026

NO TEXT FOR THIS PAGE

TABLE OF CONTENTS

CONTRACT CAT-475

High Level Outlet (HLO) Installation at Gilboa Dam and Crest Gate Removal
Schoharie County, New York

VOLUME 2 OF 2

Contract Terms

Title	Page No.
Notice to Bidders	**1**
Notice of Electronic Claims	**2**
New York City Standard Construction Contract (Cover Page)	**3**
Schoharie County Prevailing Wage Rates (Cover Page)	**131**
Schedule of Workmen, Mechanics and Laborers	**133**
General Conditions	**181**
Schedule A	**193**

Specifications

Cover Page **203**

DIVISION 01 – GENERAL REQUIREMENTS

01 11 00	Summary of Work	205
01 14 00	Work Restrictions	221
01 24 10	Value Engineering	239
01 27 00	Measurement and Payment	245
01 29 10	Schedule of Values	253
01 31 10	Project Partnering	263
01 31 15	Project Coordination	269
01 31 19	Project Meetings	273
01 31 25	Web Based Project Management Information System	277
01 32 10	Progress Scheduling	285
01 32 30	Job Photographs and Videos	311
01 33 00	Submittal Procedures	319
01 35 00	Diving Services	335

01 35 27	Environmental, Health and Safety Requirements	345
01 35 44	Working in Hazardous (Classified) Locations	391
01 35 45	Hazardous Materials Control	401
01 35 55	Site Security	409
01 35 63.01	Sustainability Requirements	455
01 41 00	Regulatory Requirements	465
01 42 00	References	473
01 43 05	Contractor's Work Quality	489
01 43 10	Quality Assurance Inspection	499
01 43 15	Witness Shop Testing	509
01 43 20	Approval of Product Manufacturers	517
01 51 11	Temporary Water and Sanitary Services	523
01 51 12	Temporary Heat and Ventilation	527
01 51 30	Temporary Electrical System	531
01 52 10	Temporary Field Office Trailers	541
01 52 40	Field Office Equipment and Supplies	555
01 52 50	Temporary Guard Booths	561
01 55 00	Vehicular Access and Parking	565
01 55 26	Traffic Control	571
01 56 00	Temporary Barriers and Enclosures	585
01 57 00	Temporary Controls	591
01 57 16	Temporary Pest Control	601
01 58 13	Temporary Project Signage	607
01 61 50	General Product Requirements	615
01 65 00	Product Delivery Requirements	623
01 66 00	Protection of Materials & Equipment	629
01 71 30	Protection and Restoration of Structures	633
01 71 50	General Construction Requirements	641
01 73 12	Maintenance of Operations and Construction Staging	649
01 73 17	Installation of Equipment	657
01 74 17	Cleaning and Site Maintenance	665
01 74 20	Construction Waste Management	671
01 75 10	Preliminary and Final Field Tests	679
01 78 10	Project Closeout	685
01 78 24	Spare Parts and Maintenance Materials	691
01 78 25	Operations and Maintenance Manuals	697
01 78 39	Final Record Documents	705

01 78 40 Records in Paper Formats....717
01 78 42 Records in Electronic Formats....723
01 79 05 Equipment Start-up and Training....731
01 91 00 Commissioning....739

DIVISION 02 – EXISTING CONDITIONS

02 24 20 Soil Sampling and Analysis....747
02 41 10 Demolition and Removals....767
02 68 00 Work on Reservoir and Diversion of Water....779
02 82 05 Asbestos Management....799
02 83 05 Lead Management....827
02 84 05 PCB Management....855
02 84 10 Mercury Management....887

DIVISION 03 – CONCRETE

03 10 00 Concrete Forming and Accessories....901
03 21 00 Reinforcing Steel....919
03 30 00 Cast-in-Place Concrete....939
03 32 00 Joints in Concrete....1,037
03 35 00 Concrete Finishing....1,053
03 60 00 Grouting....1,067

DIVISION 04 – MASONRY

04 01 00 Maintenance of Masonry....1,079
04 05 00 Common Work Results for Masonry....1,085
04 40 00 Stone Assemblies....1,093

DIVISION 05 – METALS

05 05 13.01 Galvanizing....1,099
05 05 23.01 Welding....1,107
05 05 23.02 Miscellaneous Metal Fastenings....1,117
05 06 00.01 Schedules for Stainless Steel Work....1,131
05 12 00 Structural Steel Framing....1,145
05 50 00 Metal Fabrications....1,161
05 52 13.07 Aluminum Pipe Railing....1,171
05 59 16 Fabricated Metal Access Hatches....1,191

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 14 00 Fluid-Applied Waterproofing....1,203
07 62 00 Sheet Metal Flashing and Trim....1,217

07 90 00 Joint Protection 1,225

DIVISION 08 – OPENINGS

08 03 00 Waterproof Doors 1,237
08 71 01 Finish Door Hardware 1,245
08 91 20 Fixed Louvers 1,257

DIVISION 09 – FINISHES

09 91 00 Painting 1,263

DIVISION 10 – SPECIALTIES

10 14 01 Identifying Devices 1,287
10 44 16 Fire Extinguishers 1,295

DIVISION 23 – HVAC

23 05 93 Testing, Adjusting, and Balancing for HVAC 1,299
23 31 14 Metal Ducts and Accessories 1,315
23 34 00 HVAC Fans 1,331

DIVISION 26 – ELECTRICAL

26 05 11 General Electrical Requirements 1,341
26 05 20 Low-Voltage Wires, Cables and Accessories 1,347
26 05 27 Grounding 1,361
26 05 29 Hangers and Supports for Electrical Systems 1,367
26 05 33 Raceways and Boxes for Electrical Systems 1,373
26 05 43 Underground Ducts, Manholes and Raceways for Electrical Systems 1,393
26 05 53 Identification for Electrical Systems 1,403
26 05 73 Power System Studies 1,409
26 06 11 Cable and Conduit Schedule 1,423
26 08 11 General Electrical Testing 1,427
26 24 16 Panelboards 1,435
26 28 13 Low-Voltage Fuses 1,443
26 41 13 Lightning Protection for Structures 1,447
26 51 11 Lighting Fixtures, Devices and Schedules 1,457
26 56 11 Outdoor Lighting 1,471

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 20 00	Video Surveillance	1,479
28 30 00	Security Detection, Alarm, and Monitoring	1,491

DIVISION 31 – EARTHWORK

31 23 23	Fill	1,501
31 25 10	Dust, Soil Erosion and Sediment Control	1,519
31 71 22	Hand Tunneling	1,533
31 72 15	Initial Tunnel Support	1,541
31 74 20	Installation of Outlet Pipe	1,549
31 74 22	Tunnel Backfilling	1,553

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 90 00	Planting	1,559

DIVISION 40 – PROCESS INTERCONNECTIONS

40 05 05	Exposed Piping Installation	1,579
40 05 05.30	Leakage Testing for Exposed Piping	1,611
40 05 06	Couplings, Adapters, and Specials for Process Piping	1,619
40 05 07	Hangers and Supports for Process Piping	1,637
40 05 22	Steel and Stainless Steel Process Pipe	1,655
40 05 53	Process Valves 24-Inch Diameter and Smaller	1,683
40 05 58	Bonneted Knife Gate Valves	1,759
40 05 97	Identification for Process Equipment	1,787
40 06 01	Schedule for Exposed Piping	1,817
40 61 13	PMCS General Requirements	1,823
40 61 26	PMCS Training	1,847
40 61 93	PMCS Input Output List	1,855
40 61 94	PMCS Instrument Index	1,863
40 61 94.223	Vibrating Wire Piezometer	1,869
40 61 94.225	Ultrasonic Pipe Flow Transmitter	1,870
40 61 94.409	Float Switch	1,871
40 61 95	PMCS Monitoring and Control Criteria	1,873
40 61 96	PMCS Control Strategies	1,891
40 63 43	PMCS Programmable Logic Controllers	1,899
40 67 16	PMCS Panels and Enclosures	1,915
40 78 90	PMCS Panel Mounted Instruments and Devices	1,935
40 79 91	PMCS Field Instruments	1,949
40 80 81	PMCS Factory Testing	1,961

40 80 82 PMCS Startup and Field Testing 1,969

DIVISION 41 – MATERIAL PROCESSING AND HANDLING EQUIPMENT

41 67 16 Fall Protection Systems 1,979

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT

46 66 00 Water Treatment System.....1,989

Notice To Bidders

Web-based access to BEDC EHS information

In conjunction with the requirements of Detailed Specification 01 35 27 – Environmental, Health and Safety (EHS) Requirements, DEP's Bureau of Engineering Design & Construction (BEDC) has provided the most recent version of DEP's EHS Policies and Procedures, BEDC EHS Standards, and other DEP EHS guidelines and additional information on the DEP Knowledge Reservoir of the BEDC web-based Project Management Information System (PMIS) at the following website: https://app.e-builder.net/public/publicLanding.aspx?QS=33fcd8611637450095d280fe48f856f1

For any question regarding the website, contact BEDC EHS at (718) 595-6228 or bedcehs@dep.nyc.gov.

Compliance with the latest versions of DEP EHS Policies and Procedures, BEDC EHS Standards, and DEP Guidelines are required on all DEP Contract work.

* * * * * * *

Rev. 7/2020

NOTICE TO NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION CONTRACTORS

Please be advised that all notices required to be submitted to the New York City Department of Environmental Protection ("DEP") Commissioner pursuant to Article 11, Article 27, Article 30, and Article 78[1] of the City of New York Standard Construction Contract must now instead be submitted electronically to the following email address: commcontractnotices@dep.nyc.gov.[2] Upon receipt, DEP will send an acknowledgement via email. The DEP Commissioner will no longer accept physical copies of said notices.

If a contractor is unable to comply with this notice, please contact commcontractnotices@dep.nyc.gov immediately to make alternative arrangements.

Please note the above email address may only accept messages that are ten megabytes or smaller. If your submission is larger than that, please contact commcontractnotices@dep.nyc.gov to request a link that will allow you to upload the documents.

Thank you for your anticipated cooperation.

[1]Please note that Article 78 appears only in the 2017 City of New York Standard Construction Contract.
[2]Please be advised that this notice only applies to documents that must be submitted to the DEP Commissioner. Please follow the contract and the Procurement Board Policy Rules when submitting documents to the Comptroller of the City of New York, the Contract Dispute Resolution Board, or any other entity.

2017 City of New York
Standard Construction Contract
(+ Riders)

Rev. 01/2026

NO TEXT FOR THIS PAGE

CITY OF NEW YORK

STANDARD CONSTRUCTION CONTRACT

March 2017

NO TEXT ON THIS PAGE

CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT

TABLE OF CONTENTS

CHAPTER I: THE CONTRACT AND DEFINITIONS 1
ARTICLE 1. THE CONTRACT 1
ARTICLE 2. DEFINITIONS 1
CHAPTER II: THE WORK AND ITS PERFORMANCE 4
ARTICLE 3. CHARACTER OF THE WORK 4
ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION 4
ARTICLE 5. COMPLIANCE WITH LAWS 5
ARTICLE 6. INSPECTION 10
ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICES AND INDEMNIFICATION 11
CHAPTER III: TIME PROVISIONS 12
ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK 12
ARTICLE 9. PROGRESS SCHEDULES 13
ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL 13
ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY 14
ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS 18
ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE 19
ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK 21
ARTICLE 15. LIQUIDATED DAMAGES 23
ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION 23
CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS 24
ARTICLE 17. SUBCONTRACTS 24
ARTICLE 18. ASSIGNMENTS 26
CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE 26
ARTICLE 19. SECURITY DEPOSIT 26
ARTICLE 20. PAYMENT GUARANTEE 27
ARTICLE 21. RETAINED PERCENTAGE 29
ARTICLE 22. INSURANCE 30
ARTICLE 23. MONEY RETAINED AGAINST CLAIMS 36
ARTICLE 24. MAINTENANCE AND GUARANTY 37
CHAPTER VI: CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM 38
ARTICLE 25. CHANGES 38
ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK 38
ARTICLE 27. RESOLUTION OF DISPUTES 41
ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON A TIME & MATERIALS BASIS 45
ARTICLE 29. OMITTED WORK 46
ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS 46
CHAPTER VII: POWERS OF THE RESIDENT ENGINEER,THE ENGINEER OR ARCHITECT AND THE COMMISSIONER 48
ARTICLE 31. THE RESIDENT ENGINEER 48
ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER 48
ARTICLE 33. THE COMMISSIONER 48
ARTICLE 34. NO ESTOPPEL 49
CHAPTER VIII: LABOR PROVISIONS 49
ARTICLE 35. EMPLOYEES 49
ARTICLE 36. NO DISCRIMINATION 57
ARTICLE 37. LABOR LAW REQUIREMENTS 59

ARTICLE 38. PAYROLL REPORTS **64**
ARTICLE 39. DUST HAZARDS **64**
CHAPTER IX: PARTIAL AND FINAL PAYMENTS 65
ARTICLE 40. CONTRACT PRICE **65**
ARTICLE 41. BID BREAKDOWN ON LUMP SUM **65**
ARTICLE 42. PARTIAL PAYMENTS **65**
ARTICLE 43. PROMPT PAYMENT **66**
ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT **66**
ARTICLE 45. FINAL PAYMENT **67**
ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT **68**
ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION **69**
CHAPTER X: CONTRACTOR'S DEFAULT 69
ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT **69**
ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT **71**
ARTICLE 50. QUITTING THE SITE **71**
ARTICLE 51. COMPLETION OF THE WORK **71**
ARTICLE 52. PARTIAL DEFAULT **71**
ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK **72**
ARTICLE 54. OTHER REMEDIES **72**
CHAPTER XI: MISCELLANEOUS PROVISIONS 72
ARTICLE 55. CONTRACTOR'S WARRANTIES **72**
ARTICLE 56. CLAIMS AND ACTIONS THEREON **73**
ARTICLE 57. INFRINGEMENT **73**
ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES **74**
ARTICLE 59. SERVICE OF NOTICES **74**
ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT **74**
ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED **74**
ARTICLE 62. TAX EXEMPTION **74**
ARTICLE 63. INVESTIGATION(S) CLAUSE **76**
ARTICLE 64. TERMINATION BY THE CITY **78**
ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE **80**
ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT **81**
ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM **82**
ARTICLE 68. ANTITRUST **82**
ARTICLE 69. MACBRIDE PRINCIPLES PROVISIONS **83**
ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB **85**
ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS **85**
ARTICLE 72. CONFLICTS OF INTEREST **85**
ARTICLE 73. MERGER CLAUSE **85**
ARTICLE 74. STATEMENT OF WORK **85**
ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR **85**
ARTICLE 76. ELECTRONIC FUNDS TRANSFER **85**
ARTICLE 77. RECORDS RETENTION **86**
ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS **86**

WITNESSETH:

The parties, in consideration of the mutual agreements contained herein, agree as follows:

CHAPTER I: THE CONTRACT AND DEFINITIONS

ARTICLE 1. THE CONTRACT

1.1 Except for titles, subtitles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, shall be deemed to be part of this **Contract**:

1.1.1 All provisions required by law to be inserted in this **Contract**, whether actually inserted or not;

1.1.2 The Contract Drawings and Specifications;

1.1.3 The General Conditions and Special Conditions, if any;

1.1.4 The **Contract**;

1.1.5 The Information for Bidders; Request for Proposals; Notice of Solicitation and Proposal For Bids; Bid or Proposal, and, if used, the Bid Booklet;

1.1.6 All Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed or the Order to Work.

1.2 Should any conflict occur in or between the Drawings and Specifications, the **Contractor** shall be deemed to have estimated the most expensive way of doing the **Work**, unless the **Contractor** shall have asked for and obtained a decision in writing from the **Commissioner** of the **Agency** that is entering into this **Contract**, before the submission of its bid, as to what shall govern.

ARTICLE 2. DEFINITIONS

2.1 The following words and expressions, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless a different meaning is clear from the context:

2.1.1 **"Addendum"** or **"Addenda"** shall mean the additional Contract provisions and/or technical clarifications issued in writing by the Commissioner prior to the receipt of bids.

2.1.2 **"Agency"** shall mean a city, county, borough or other office, position, department, division, bureau, board or commission, or a corporation, institution or agency of government, the expenses of which are paid in whole or in part from the City treasury.

2.1.3 **"Agency Chief Contracting Officer" (ACCO)** shall mean a person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the CCPO, or his/her duly authorized representative.

2.1.4 **"Allowance"** shall mean a sum of money which the Agency may include in the total amount of the Contract for such specific contingencies as the Agency believes may be necessary to complete the Work, *e.g.*, lead or asbestos remediation, and for which the Contractor will be paid on the basis of stipulated unit prices or a formula set forth in the Contract or negotiated between the parties provided, however, that if the Contractor is not directed to use the Allowance, the Contractor shall have no right to such money and it shall be deducted from the total amount of the Contract.

2.1.5 **"City"** shall mean the City of New York.

2.1.6 **"City Chief Procurement Officer" (CCPO)** shall mean a person delegated authority by the Mayor to coordinate and oversee the procurement activity of Mayoral agency staff, including the ACCO and any offices which have oversight responsibility for the procurement of construction, or his/her duly authorized representative.

2.1.7 **"Commissioner"** shall mean the head of the Agency that has entered into this Contract, or his/her duly authorized representative.

2.1.8 **"Comptroller"** shall mean the Comptroller of the City of New York.

2.1.9 **"Contract"** or **"Contract Documents"** shall mean each of the various parts of the contract referred to in Article 1 hereof, both as a whole and severally.

2.1.10 **"Contract Drawings"** shall mean only those drawings specifically entitled as such and listed in the Specifications or in any Addendum, or any drawings furnished by the Commissioner, pertaining or supplemental thereto.

2.1.11 **"Contract Work"** shall mean everything required to be furnished and done by the Contractor by any one or more of the parts of the Contract referred to in Article 1, except Extra Work as hereinafter defined.

2.1.12 **"Contractor"** shall mean the entity which executed this Contract, whether a corporation, firm, partnership, joint venture, individual, or any combination thereof, and its, their, his/her successors, personal representatives, executors, administrators, and assigns, and any person, firm, partnership, joint venture, individual, or corporation which shall at any time be substituted in the place of the Contractor under this Contract.

2.1.13 **"Days"** shall mean calendar days, except where otherwise specified.

2.1.14 **"Engineer"** or **"Architect"** or **"Project Manager"** shall mean the person so designated in writing by the Commissioner in the Notice to Proceed or the Order to Work to act as such in relation to this Contract, including a private Architect or Engineer or Project Manager, as the case may be. Subject to written approval by the Commissioner, the Engineer, Architect or Project Manager may designate an authorized representative.

2.1.15 **"Engineering Audit Officer" (EAO)** shall mean the person so designated by the Commissioner to perform responsible auditing functions hereunder.

2.1.16 **"Extra Work"** shall mean Work other than that required by the Contract at the time of award which is authorized by the Commissioner pursuant to Chapter VI of this Contract.

2.1.17 **"Federal-Aid Contract"** shall mean a contract in which the United States (federal) Government provides financial funding as so designated in the Information for Bidders.

2.1.18 **"Final Acceptance"** shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

2.1.19 **"Final Approved Punch List"** shall mean a list, approved pursuant to Article 14.2.2, specifying those items of Work to be completed by the Contractor after Substantial Completion and dates for the completion of each item of Work.

2.1.20 **"Law"** or **"Laws"** shall mean the Constitution of the State of New York, the New York City Charter, the New York City Administrative Code, a statute of the United States or of the State of New York, a local law of the City of New York, any ordinance, rule or regulation having the force of law, or common law.

2.1.21 **"Materialman"** shall mean any corporation, firm, partnership, joint venture, or individual, other than employees of the Contractor, who or which contracts with the Contractor or any Subcontractor, to fabricate or deliver, or who actually fabricates or delivers, plant, materials or equipment to be incorporated in the Work.

2.1.22 **"Means and Methods of Construction"** shall mean the labor, materials, temporary structures, tools, plant, and construction equipment, and the manner and time of their use, necessary to accomplish the result intended by this Contract.

2.1.23**"Notice to Proceed" or "Order to Work"** shall mean the written notice issued by the Commissioner specifying the time for commencement of the Work and the Engineer, Architect or Project Manager.

2.1.24 **"Other Contractor(s)"** shall mean any contractor (other than the entity which executed this Contract or its Subcontractors) who or which has a contract with the City for work on or adjacent to the building or Site of the Work.

2.1.25 **"Payroll Taxes"** shall mean State Unemployment Insurance (SUI), Federal Unemployment Insurance (FUI), and payments pursuant to the Federal Insurance Contributions Act (FICA).

2.1.26 **"Project"** shall mean the public improvement to which this Contract relates.

2.1.27 **"Procurement Policy Board" (PPB)** shall mean the Agency of the City of New York whose function is to establish comprehensive and consistent procurement policies and rules which shall have broad application throughout the City.

2.1.28 **"Required Quantity"** in a unit price Contract shall mean the actual quantity of any item of Work or materials which is required to be performed or furnished in order to comply with the Contract.

2.1.29 **"Resident Engineer"** shall mean the representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the Work.

2.1.30 **"Site"** shall mean the area upon or in which the Contractor's operations are carried on, and such other areas adjacent thereto as may be designated as such by the Engineer.

2.1.31 **"Small Tools"** shall mean items that are ordinarily required for a worker's job function, including but not limited to, equipment that ordinarily has no licensing, insurance or substantive storage costs associated with it; such as circular and chain saws, impact drills, threaders, benders, wrenches, socket tools, etc.

2.1.32 **"Specifications"** shall mean all of the directions, requirements, and standards of performance applying to the Work as hereinafter detailed and designated under the Specifications.

2.1.33 **"Subcontractor"** shall mean any person, firm or corporation, other than employees of the Contractor, who or which contracts with the Contractor or with its subcontractors to furnish, or actually furnishes labor, or labor and materials, or labor and equipment, or superintendence, supervision and/or management at the Site. Wherever the word Subcontractor appears, it shall also mean sub-Subcontractor.

2.1.34 **"Substantial Completion"** shall mean the written determination by the Engineer that the Work required under this Contract is substantially, but not entirely, complete and the approval of the **Final Approved Punch List**.

2.1.35 **"Work"** shall mean all services required to complete the Project in accordance with the Contract Documents, including without limitation, labor, material, superintendence, management, administration, equipment, and incidentals, and obtaining any and all permits, certifications and licenses as may be necessary and required to complete the Work, and shall include both Contract Work and Extra Work.

CHAPTER II: THE WORK AND ITS PERFORMANCE

ARTICLE 3. CHARACTER OF THE WORK

3.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Work** shall be performed in accordance with the best modern practice, utilizing, unless otherwise specified in writing, new and unused materials of standard first grade quality and workmanship and design of the highest quality, to the satisfaction of the **Commissioner**.

ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION

4.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Means and Methods of Construction** shall be such as the **Contractor** may choose; subject, however, to the **Engineer's** right to reject the **Means and Methods of Construction** proposed by the **Contractor** which in the opinion of the **Engineer**:

4.1.1 Will constitute or create a hazard to the **Work**, or to persons or property; or

4.1.2 Will not produce finished **Work** in accordance with the terms of the **Contract**; or

4.1.3 Will be detrimental to the overall progress of the **Project**.

4.2 The **Engineer's** approval of the **Contractor's Means and Methods of Construction**, or his/her failure to exercise his/her right to reject such means or methods, shall not relieve the **Contractor**

of its obligation to complete the **Work** as provided in this **Contract**; nor shall the exercise of such right to reject create a cause of action for damages.

ARTICLE 5. COMPLIANCE WITH LAWS

5.1 The **Contractor** shall comply with all **Laws** applicable to this **Contract** and to the **Work** to be done hereunder.

5.2 Procurement Policy Board Rules: This **Contract** is subject to the Rules of the **PPB** ("**PPB** Rules") in effect at the time of the bid opening for this **Contract**. In the event of a conflict between the **PPB** Rules and a provision of this **Contract**, the **PPB** Rules shall take precedence.

5.3 Noise Control Code provisions.

5.3.1 In accordance with the provisions of Section 24-216(b) of the Administrative Code of the **City** ("Administrative Code"), Noise Abatement Contract Compliance, devices and activities which will be operated, conducted, constructed or manufactured pursuant to this **Contract** and which are subject to the provisions of the **City** Noise Control Code shall be operated, conducted, constructed, or manufactured without causing a violation of the Administrative Code. Such devices and activities shall incorporate advances in the art of noise control development for the kind and level of noise emitted or produced by such devices and activities, in accordance with regulations issued by the **Commissioner** of the **City** Department of Environmental Protection.

5.3.2 The **Contractor** agrees to comply with Section 24-219 of the Administrative Code and implementing rules codified at 15 Rules of the City of New York ("RCNY") Section 28-100 *et seq*. In accordance with such provisions, the **Contractor**, if the **Contractor** is the responsible party under such regulations, shall prepare and post a Construction Noise Mitigation Plan at each **Site**, in which the **Contractor** shall certify that all construction tools and equipment have been maintained so that they operate at normal manufacturers operating specifications. If the **Contractor** cannot make this certification, it must have in place an Alternative Noise Mitigation Plan approved by the **City** Department of Environmental Protection. In addition, the **Contractor**'s certified Construction Noise Mitigation Plan is subject inspection by the **City** Department of Environmental Protection in accordance with Section 28-101 of Title 15 of RCNY. No **Contract Work** may take place at a **Site** unless there is a Construction Noise Mitigation Plan or approved Alternative Noise Mitigation Plan in place. In addition, the **Contractor** shall create and implement a noise mitigation training program. Failure to comply with these requirements may result in fines and other penalties pursuant to the applicable provisions of the Administrative Code and RCNY.

5.4 Ultra Low Sulfur Diesel Fuel: In accordance with the provisions of Section 24-163.3 of the Administrative Code, the **Contractor** specifically agrees as follows:

5.4.1 Definitions. For purposes of this Article 5.4, the following definitions apply:

5.4.1(a) "Contractor" means any person or entity that enters into a Public Works Contract with a **City Agency**, or any person or entity that enters into an agreement with such person or entity, to perform work or provide labor or services related to such Public Works Contract.

5.4.1(b) "Motor Vehicle" means any self-propelled vehicle designed for transporting persons or property on a street or highway.

5.4.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.4.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this term shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) horsepower or less and that are not used in any construction program or project.

5.4.1(e) "Public Works Contract" means a contract with a **City Agency** for a construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; a contract with a **City Agency** for the preparation for any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; or a contract with a **City Agency** for any final work involved in the completion of any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge.

5.4.1(f) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.4.2 Ultra Low Sulfur Diesel Fuel

5.4.2(a) All **Contractors** shall use Ultra Low Sulfur Diesel Fuel in diesel-powered Nonroad Vehicles in the performance of this **Contract**.

5.4.2(b) Notwithstanding the requirements of Article 5.4.2(a), **Contractors** may use diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) to fulfill the requirements of this Article 5.4.2, where the Commissioner of the **City** Department of Environmental Protection ("DEP Commissioner") has issued a determination that a sufficient quantity of Ultra Low Sulfur Diesel Fuel is not available to meet the needs of **Agencies** and **Contractors**. Any such determination shall expire after six (6) months unless renewed.

5.4.2(c) **Contractors** shall not be required to comply with this Article 5.4.2 where the **City Agency** letting this **Contract** makes a written finding, which is approved, in writing, by the DEP Commissioner, that a sufficient quantity of Ultra Low Sulfur Diesel Fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is not available to meet the requirements of Section 24-163.3 of the Administrative Code, provided that such **Contractor** in its fulfillment of the

requirements of this **Contract**, to the extent practicable, shall use whatever quantity of Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is available. Any finding made pursuant to this Article 5.4.2(c) shall expire after sixty (60) **Days**, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the **City Agency** renews the finding in writing and such renewal is approved by the DEP Commissioner.

5.4.2(d) **Contractors** may check on determinations and approvals issued by the DEP Commissioner pursuant to Section 24-163.3 of the Administrative Code, if any, at www.dep.nyc.gov or by contacting the **City Agency** letting this **Contract**.

5.4.2(e) The requirements of this Article 5.4.2 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.3 Best Available Technology

5.4.3(a) All **Contractors** shall utilize the best available technology for reducing the emission of pollutants for diesel-powered Nonroad Vehicles in the performance of this **Contract**. For determinations of best available technology for each type of diesel-powered Nonroad Vehicle, **Contractors** shall comply with the regulations of the **City** Department of Environmental Protection, as and when adopted, Chapter 14 of Title 15 of the Rules of the City of New York (RCNY). The **Contractor** shall fully document all steps in the best available technology selection process and shall furnish such documentation to the **City Agency** or the DEP Commissioner upon request. The **Contractor** shall retain all documentation generated in the best available technology selection process for as long as the selected best available technology is in use.

5.4.3(b) No **Contractor** shall be required to replace best available technology for reducing the emission of pollutants or other authorized technology utilized for a diesel-powered Nonroad Vehicle in accordance with the provisions of this Article 5.4.3 within three (3) years of having first utilized such technology for such vehicle.

5.4.3(c) This Article 5.4.3 shall not apply to any vehicle used to satisfy the requirements of a specific Public Works Contract for fewer than twenty (20) **Days**.

5.4.3(d) The **Contractor** shall not be required to comply with this Article 5.4.3 with respect to a diesel-powered Nonroad Vehicle under the following circumstances:

5.4.3(d)(i) Where the **City Agency** makes a written finding, which is approved, in writing, by the DEP Commissioner, that the best available technology for reducing the emission of pollutants as required by this Article 5.4.3 is unavailable for such vehicle, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle.

5.4.3(d)(ii) Where the DEP Commissioner has issued a written waiver based upon the **Contractor** having demonstrated to the DEP Commissioner that the use of the best available technology for reducing the emission of pollutants might endanger the operator of such vehicle or those working near such vehicle, due to engine malfunction, the **Contractor** shall use whatever technology for

reducing the emission of pollutants, if any, is available and appropriate for such vehicle, which would not endanger the operator of such vehicle or those working near such vehicle.

5.4.3(d)(iii) In determining which technology to use for the purposes of Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above, the **Contractor** shall primarily consider the reduction in emissions of particulate matter and secondarily consider the reduction in emissions of nitrogen oxides associated with the use of such technology, which shall in no event result in an increase in the emissions of either such pollutant.

5.4.3(d)(iv) The **Contractor** shall submit requests for a finding or a waiver pursuant to this Article 5.4.3(d) in writing to the DEP Commissioner, with a copy to the **ACCO** of the **City Agency** letting this **Contract**. Any finding or waiver made or issued pursuant to Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above shall expire after one hundred eighty (180) **Days**, at which time the requirements of Article 5.4.3(a) shall be in full force and effect unless the **City Agency** renews the finding, in writing, and the DEP Commissioner approves such finding, in writing, or the DEP Commissioner renews the waiver, in writing.

5.4.3(e) The requirements of this Article 5.4.3 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.4 Section 24-163 of the Administrative Code. The **Contractor** shall comply with Section 24-163 of the Administrative Code related to the idling of the engines of motor vehicles while parking.

5.4.5 Compliance

5.4.5(a) The **Contractor's** compliance with Article 5.4 may be independently monitored. If it is determined that the **Contractor** has failed to comply with any provision of Article 5.4, any costs associated with any independent monitoring incurred by the **City** shall be reimbursed by the **Contractor**.

5.4.5(b) Any **Contractor** who violates any provision of Article 5.4, except as provided in Article 5.4.5(c) below, shall be liable for a civil penalty between the amounts of one thousand ($1,000) and ten thousand ($10,000) dollars, in addition to twice the amount of money saved by such **Contractor** for failure to comply with Article 5.4.

5.4.5(c) No **Contractor** shall make a false claim with respect to the provisions of Article 5.4 to a **City Agency**. Where a **Contractor** has been found to have done so, such **Contractor** shall be liable for a civil penalty of twenty thousand ($20,000) dollars, in addition to twice the amount of money saved by such **Contractor** in association with having made such false claim.

5.4.6 Reporting

5.4.6(a) For all Public Works Contracts covered by this Article 5.4, the **Contractor** shall report to the **City Agency** the following information:

5.4.6(a)(i) The total number of diesel-powered Nonroad Vehicles used to fulfill the requirements of this Public Works Contract;

5.4.6(a)(ii) The number of such Nonroad Vehicles that were powered by Ultra Low Sulfur Diesel Fuel;

5.4.6(a)(iii) The number of such Nonroad Vehicles that utilized the best available technology for reducing the emission of pollutants, including a breakdown by vehicle model and the type of technology;

5.4.6(a)(iv) The number of such Nonroad Vehicles that utilized such other authorized technology in accordance with Article 5.4.3, including a breakdown by vehicle model and the type of technology used for each such vehicle;

5.4.6(a)(v) The locations where such Nonroad Vehicles were used; and

5.4.6(a)(vi) Where a determination is in effect pursuant to Article 5.4.2(b) or 5.4.2(c), detailed information concerning the **Contractor's** efforts to obtain Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm).

5.4.6(b) The **Contractor** shall submit the information required by Article 5.4.6(a) at the completion of **Work** under the Public Works Contract and on a yearly basis no later than August 1 throughout the term of the Public Works Contract. The yearly report shall cover **Work** performed during the preceding fiscal year (July 1 - June 30).

5.5 Ultra Low Sulfur Diesel Fuel. In accordance with the Coordinated Construction Act for Lower Manhattan, as amended:

5.5.1 Definitions. For purposes of this Article 5.5, the following definitions apply:

5.5.1(a) "Lower Manhattan" means the area to the south of and within the following lines: a line beginning at a point where the United States pierhead line in the Hudson River as it exists now or may be extended would intersect with the southerly line of West Houston Street in the Borough of Manhattan extended, thence easterly along the southerly side of West Houston Street to the southerly side of Houston Street, thence easterly along the southerly side of Houston Street to the southerly side of East Houston Street, thence northeasterly along the southerly side of East Houston Street to the point where it would intersect with the United States pierhead line in the East River as it exists now or may be extended, including tax lots within or immediately adjacent thereto.

5.5.1(b) "Lower Manhattan Redevelopment Project" means any project in Lower Manhattan that is funded in whole or in part with federal or State funding, or any project intended to improve transportation between Lower Manhattan and the two air terminals in the **City** known as LaGuardia Airport and John F. Kennedy International Airport, or between Lower Manhattan and the air terminal in Newark known as Newark Liberty International Airport, and that is funded in whole or in part with federal funding.

5.5.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.5.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower (HP) and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this terms shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) HP or less and that are not used in any construction program or project.

5.5.1(e) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.5.2 Requirements. **Contractors** and **Subcontractors** are required to use only Ultra Low Sulfur Diesel Fuel to power the diesel-powered Nonroad Vehicles with engine HP rating of fifty (50) HP and above used on a Lower Manhattan Redevelopment Project and, where practicable, to reduce the emission of pollutants by retrofitting such Nonroad Vehicles with oxidation catalysts, particulate filters, or technology that achieves lowest particulate matter emissions.

5.6 Pesticides. In accordance with Section 17-1209 of the Administrative Code, to the extent that the **Contractor** or any **Subcontractor** applies pesticides to any property owned or leased by the **City**, the **Contractor,** and any **Subcontractor** shall comply with Chapter 12 of the Administrative Code.

5.7 Waste Treatment, Storage, and Disposal Facilities and Transporters. In connection with the **Work**, the **Contractor** and any **Subcontractor** shall use only those waste treatment, storage, and disposal facilities and waste transporters that possess the requisite license, permit or other governmental approval necessary to treat, store, dispose, or transport the waste, materials or hazardous substances.

5.8 Environmentally Preferable Purchasing. The **Contractor** shall ensure that products purchased or leased by the **Contractor** or any **Subcontractor** for the **Work** that are not specified by the **City** or are submitted as equivalents to a product specified by the **City** comply with the requirements of the New York City Environmentally Preferable Purchasing Program contained in Chapter 11 of Title 43 of the RCNY, pursuant to Chapter 3 of Title 6 of the Administrative Code.

ARTICLE 6. INSPECTION

6.1 During the progress of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall at all times afford the representatives of the **City** every reasonable, safe, and proper facility for inspecting all **Work** done or being done at the **Site** and also for inspecting the manufacture or preparation of materials and equipment at the place of such manufacture or preparation.

6.2 The **Contractor's** obligation hereunder shall include the uncovering or taking down of finished **Work** and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if **Work** thus exposed proves satisfactory, and if the **Contractor** has complied with Article 6.1, such uncovering or taking down and restoration shall be

considered an item of **Extra Work** to be paid for in accordance with the provisions of Article 26. If the **Work** thus exposed proves unsatisfactory, the **City** has no obligation to compensate the **Contractor** for the uncovering, taking down or restoration.

6.3 Inspection and approval by the **Commissioner**, the **Engineer**, **Project Manager**, or **Resident Engineer**, of finished **Work** or of **Work** being performed, or of materials and equipment at the place of manufacture or preparation, shall not relieve the **Contractor** of its obligation to perform the **Work** in strict accordance with the **Contract**. Finished or unfinished **Work** not found to be in strict accordance with the **Contract** shall be replaced as directed by the **Engineer**, even though such **Work** may have been previously approved and paid for. Such corrective **Work** is **Contract Work** and shall not be deemed **Extra Work**.

6.4 Rejected **Work** and materials shall be promptly taken down and removed from the **Site**, which must at all times be kept in a reasonably clean and neat condition.

ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICES AND INDEMNIFICATION

7.1 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall be under an absolute obligation to protect the finished and unfinished **Work** against any damage, loss, injury, theft and/or vandalism and in the event of such damage, loss, injury, theft and/or vandalism, it shall promptly replace and/or repair such **Work** at the **Contractor's** sole cost and expense, as directed by the **Resident Engineer**. The obligation to deliver finished **Work** in strict accordance with the **Contract** prior to **Final Acceptance** shall be absolute and shall not be affected by the **Resident Engineer's** approval of, or failure to prohibit, the **Means and Methods of Construction** used by the **Contractor**.

7.2 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall take all reasonable precautions to protect all persons and the property of the **City** and of others from damage, loss or injury resulting from the **Contractor's**, and/or its **Subcontractors'** operations under this **Contract.** The **Contractor's** obligation to protect shall include the duty to provide, place or replace, and adequately maintain at or about the **Site** suitable and sufficient protection such as lights, barricades, and enclosures.

7.3 The **Contractor** shall comply with the notification requirements set forth below in the event of any loss, damage or injury to **Work**, persons or property, or any accidents arising out of the operations of the **Contractor** and/or its **Subcontractors** under this **Contract**.

7.3.1 The **Contractor** shall make a full and complete report in writing to the **Resident Engineer** within three (3) **Days** after the occurrence.

7.3.2 The **Contractor** shall also send written notice of any such event to all insurance carriers that issued potentially responsive policies (including commercial general liability insurance carriers for events relating to the **Contractor**'s own employees) no later than twenty (20) days after such event and again no later than twenty (20) days after the initiation of any claim and/or action resulting therefrom. Such notice shall contain the following information: the number of the insurance policy, the name of the Named Insured, the date and location of the incident, and the identity of the persons injured or property damaged. For any policy on which the **City** and/or the **Engineer**, **Architect**, or **Project Manager** are Additional Insureds, such notice shall expressly specify that "this notice is

being given on behalf of the City of New York as Additional Insured, such other Additional Insureds, as well as the Named Insured."

7.3.2(a) Whenever such notice is sent under a policy on which the **City** is an Additional Insured, the **Contractor** shall provide copies of the notice to the **Comptroller,** the **Commissioner** and the **City** Corporation Counsel. The copy to the **Comptroller** shall be sent to the Insurance Unit, NYC Comptroller's Office, 1 Centre Street – Room 1222, New York, New York, 10007. The copy to the **Commissioner** shall be sent to the address set forth in Schedule A of the General Conditions. The copy to the **City** Corporation Counsel shall be sent to Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to any appropriate insurance carrier(s) in a timely and complete manner, the **Contractor** shall indemnify the **City** for all losses, judgments, settlements, and expenses, including reasonable attorneys' fees, arising from an insurer's disclaimer of coverage citing late notice by or on behalf of the **City**.

7.4 To the fullest extent permitted by law, the **Contractor** shall defend, indemnify, and hold the **City**, its employees, and officials (the "Indemnitees") harmless against any and all claims (including but not limited to claims asserted by any employee of the **Contractor** and/or its **Subcontractors**) and costs and expenses of whatever kind (including but not limited to payment or reimbursement of attorneys' fees and disbursements) allegedly arising out of or in any way related to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract** or from the **Contractor's** and/or its **Subcontractors'** failure to comply with any of the provisions of this **Contract** or of the **Law**. Such costs and expenses shall include all those incurred in defending the underlying claim and those incurred in connection with the enforcement of this Article 7.4 by way of cross-claim, third-party claim, declaratory action or otherwise. The parties expressly agree that the indemnification obligation hereunder contemplates (1) full indemnity in the event of liability imposed against the Indemnitees without negligence and solely by reason of statute, operation of **Law** or otherwise; and (2) partial indemnity in the event of any actual negligence on the part of the Indemnitees either causing or contributing to the underlying claim (in which case, indemnification will be limited to any liability imposed over and above that percentage attributable to actual fault whether by statute, by operation of **Law**, or otherwise). Where partial indemnity is provided hereunder, all costs and expenses shall be indemnified on a pro rata basis.

7.4.1 Indemnification under Article 7.4 or any other provision of the **Contract** shall operate whether or not **Contractor** or its **Subcontractors** have placed and maintained the insurance specified under Article 22.

7.5 The provisions of this Article 7 shall not be deemed to create any new right of action in favor of third parties against the **Contractor** or the **City**.

CHAPTER III: TIME PROVISIONS

ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK

8.1 The **Contractor** shall commence the **Work** on the date specified in the **Notice to Proceed** or the **Order to Work**. The time for performance of the **Work** under the **Contract** shall be computed from

the date specified in the **Notice to Proceed** or the **Order to Work**. **TIME BEING OF THE ESSENCE** to the **City**, the **Contractor** shall thereafter prosecute the **Work** diligently, using such **Means and Methods of Construction** as are in accord with Article 4 herein and as will assure its completion not later than the date specified in this Contract, or on the date to which the time for completion may be extended.

ARTICLE 9. PROGRESS SCHEDULES

9.1 To enable the **Work** to be performed in an orderly and expeditious manner, the **Contractor**, within fifteen (15) **Days** after the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule based on the Critical Path Method in the form of a bar graph or in such other form as specified by the **Engineer**, and monthly cash flow requirements, showing:

9.1.1 The anticipated time of commencement and completion of each of the various operations to be performed under this **Contract**; and

9.1.2 The sequence and interrelation of each of these operations with the others and with those of other related contracts; and

9.1.3 The estimated time required for fabrication or delivery, or both, of all materials and equipment required for the **Work**, including the anticipated time for obtaining required approvals pursuant to Article 10; and

9.1.4 The estimated amount in dollars the **Contractor** will claim on a monthly basis.

9.2 The proposed schedule shall be revised as directed by the **Engineer**, until finally approved by the **Engineer**, and after such approval, subject to the provisions of Article 11, shall be strictly adhered to by the **Contractor**.

9.3 If the **Contractor** shall fail to adhere to the approved progress schedule, or to the schedule as revised pursuant to Article 11, it shall promptly adopt such other or additional **Means and Methods of Construction**, at its sole cost and expense, as will make up for the time lost and will assure completion in accordance with the approved progress schedule. The approval by the **City** of a progress schedule which is shorter than the time allotted under the **Contract** shall not create any liability for the **City** if the approved progress schedule is not met.

9.4 The **Contractor** will not receive any payments until the proposed progress schedule is submitted.

ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL

10.1 From time to time as the **Work** progresses and in the sequence indicated by the approved progress schedule, the **Contractor** shall submit to the **Engineer** a specific request in writing for each item of information or approval required by the **Contractor**. These requests shall state the latest date upon which the information or approval is actually required by the **Contractor**, and shall be submitted in a reasonable time in advance thereof to provide the **Engineer** a sufficient time to act upon such submissions, or any necessary re-submissions thereof.

10.2 The **Contractor** shall not have any right to an extension of time on account of delays due to the **Contractor's** failure to submit requests for the required information or the required approval in accordance with the above requirements.

ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY

11.1 After the commencement of any condition which is causing or may cause a delay in completion of the **Work**, including conditions for which the **Contractor** may be entitled to an extension of time, the following notifications and submittals are required:

11.1.1 Within fifteen (15) **Days** after the **Contractor** becomes aware or reasonably should be aware of each such condition, the **Contractor** must notify the **Resident Engineer** or **Engineer**, as directed by the **Commissioner**, in writing of the existence, nature and effect of such condition upon the approved progress schedule and the **Work**, and must state why and in what respects, if any, the condition is causing or may cause a delay. Such notice shall include a description of the construction activities that are or could be affected by the condition and may include any recommendations the **Contractor** may have to address the delay condition and any activities the **Contractor** may take to avoid or minimize the delay.

11.1.2 If the **Contractor** shall claim to be sustaining damages for delay as provided for in this Article 11,within forty-five (45) **Days** from the time such damages are first incurred for each such condition, the **Contractor** shall submit to the **Commissioner** a verified written statement of the details and estimates of the amounts of such damages, including categories of expected damages and projected monthly costs, together with documentary evidence of such damages as the **Contractor** may have at the time of submission ("statement of delay damages"), as further detailed in Article 11.6. The **Contractor** may submit the above statement within such additional time as may be granted by the **Commissioner** in writing upon written request therefor.

11.1.3 Articles 11.1.1 and 11.1.2 do not relieve the **Contractor** of its obligation to comply with the provisions of Article 44.

11.2 Failure of the **Contractor** to strictly comply with the requirements of Article 11.1.1 may, in the discretion of the **Commissioner**, be deemed sufficient cause to deny any extension of time on account of delay arising out of such condition. Failure of the **Contractor** to strictly comply with the requirements of both Articles 11.1.1 and 11.1.2 shall be deemed a conclusive waiver by the **Contractor** of any and all claims for damages for delay arising from such condition and no right to recover on such claims shall exist.

11.3 When appropriate and directed by the **Engineer**, the progress schedule shall be revised by the **Contractor** until finally approved by the **Engineer**. The revised progress schedule must be strictly adhered to by the **Contractor**.

11.4 Compensable Delays

11.4.1 The **Contractor** agrees to make claim only for additional costs attributable to delay in the performance of this **Contrac**t necessarily extending the time for completion of the **Work** or resulting from acceleration directed by the **Commissioner** and required to maintain the progress schedule, occasioned solely by any act or omission to act of the **City** listed below. The **Contractor** also agrees that delay from any other cause shall be

compensated, if at all, solely by an extension of time to complete the performance of the **Work**.

11.4.1.1 The failure of the **City** to take reasonable measures to coordinate and progress the **Work** to the extent required by the **Contract**, except that the City shall not be responsible for the **Contractor's** obligation to coordinate and progress the **Work** of its **Subcontractors**.

11.4.1.2 Unreasonable delays attributable to the review of shop drawings, the issuance of change orders, or the cumulative impact of change orders that were not brought about by any act or omission of the **Contractor**.

11.4.1.3 The unavailability of the **Site** caused by acts or omissions of the **City**..

11.4.1.4 The issuance by the **Engineer** of a stop work order that was not brought about through any act or omission of the **Contractor**.

11.4.1.5 Differing site conditions or environmental hazards that were neither known nor reasonably ascertainable on a pre-bid inspection of the **Site** or review of the bid documents or other publicly available sources, and that are not ordinarily encountered in the **Project**'s geographical area or neighborhood or in the type of **Work** to be performed.

11.4.1.6 Delays caused by the **City's** bad faith or its willful, malicious, or grossly negligent conduct;

11.4.1.7 Delays not contemplated by the parties;

11.4.1.8 Delays so unreasonable that they constitute an intentional abandonment of the **Contract** by the **City**; and

11.4.1.9 Delays resulting from the **City's** breach of a fundamental obligation of the **Contract**.

11.4.2 No claim may be made for any alleged delay in **Substantial Completion** of the **Work** if the **Work** will be or is substantially completed by the date of **Substantial Completion** provided for in Schedule A unless acceleration has been directed by the **Commissioner** to meet the date of **Substantial Completion** set forth in Schedule A, or unless there is a provision in the **Contract** providing for additional compensation for early completion.

11.4.3 The provisions of this Article 11 apply only to claims for additional costs attributable to delay and do not preclude determinations by the **Commissioner** allowing reimbursements for additional costs for **Extra Work** pursuant to Articles 25 and 26 of this **Contract**. To the extent that any cost attributable to delay is reimbursed as part of a change order, no additional claim for compensation under this Article 11 shall be allowed.

11.5 Non-Compensable Delays. The **Contractor** agrees to make no claim for, and is deemed to have included in its bid prices for the various items of the **Contract**, the extra/additional costs attributable to any delays caused by or attributable to the items set forth below. For such items, the **Contractor** shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**, in accordance with the provisions of Article 13. Such extensions of time will be granted, if at all, pursuant to the grounds set forth in Article 13.3.

11.5.1 The acts or omissions of any third parties, including but not limited to **Other Contractors**, public/ governmental bodies (other than **City Agencies**), utilities or private enterprises, who are disclosed in the **Contract Documents** or are ordinarily encountered or generally recognized as related to the **Work**;

11.5.2 Any situation which was within the contemplation of the parties at the time of entering into the **Contract**, including any delay indicated or disclosed in the **Contract Documents** or that would be generally recognized by a reasonably prudent contractor as related to the nature of the **Work**, and/or the existence of any facility or appurtenance owned, operated or maintained by any third party, as indicated or disclosed in the **Contract Documents** or ordinarily encountered or generally recognized as related to the nature of the **Work**;

11.5.3 Restraining orders, injunctions or judgments issued by a court which were caused by a Contractor's submission, action or inaction or by a Contractor's **Means and Methods of Construction**, or by third parties, unless such order, injunction or judgment was the result of an act or omission by the **City**;

11.5.4 Any labor boycott, strike, picketing, lockout or similar situation;

11.5.5 Any shortages of supplies or materials, or unavailability of equipment, required by the **Contract Work**;

11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God, or acts of war or of the public enemy or terrorist acts, including the **City's** reasonable responses thereto; and

11.5.7 **Extra Work** which does not significantly affect the overall completion of the **Contract**, reasonable delays in the review or issuance of change orders or field orders and/or in shop drawing reviews or approvals.

11.6 Required Content of Submission of Statement of Delay Damages

11.6.1 In the verified written statement of delay damages required by Article 11.1.2, the following information shall be provided by the **Contractor**:

11.6.1.1 For each delay, the start and end dates of the claimed periods of delay and, in addition, a description of the operations that were delayed, an explanation of how they were delayed, and the reasons for the delay, including identifying the applicable act or omission of the City listed in Article 11.4.

11.6.1.2 A detailed factual statement of the claim providing all necessary dates, locations and items of **Work** affected by the claim.

11.6.1.3 The estimated amount of additional compensation sought and a breakdown of that amount into categories as described in Article 11.7.

11.6.1.4 Any additional information requested by the **Commissioner**.

11.7 Recoverable Costs

11.7.1 Delay damages may be recoverable for the following costs actually and necessarily incurred in the performance of the **Work**:

11.7.1.1 Direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits, based on time and materials records;

11.7.1.2 Necessary materials (including transportation to the **Site**), based on time and material records;

11.7.1.3 Reasonable rental value of necessary plant and equipment other than small tools, plus fuel/energy costs according to the applicable formula set forth in Articles 26.2.4 and/or 26.2.8, based on time and material records;

11.7.1.4 Additional insurance and bond costs;

11.7.1.5 Extended **Site** overhead, field office rental, salaries of field office staff, on-site project managers and superintendents, field office staff vehicles, **Project-**specific storage, field office utilities and telephone, and field office consumables;

11.7.1.6 Labor escalation costs based on actual costs;

11.7.1.7 Materials and equipment escalation costs based on applicable industry indices unless documentation of actual increased cost is provided;

11.7.1.8 Additional material and equipment storage costs based on actual documented costs and additional costs necessitated by extended manufacturer warranty periods; and

11.7.1.9 Extended home office overhead calculated based on the following formula:

(1) Subtract from the original **Contract** amount the amount earned by original contractual **Substantial Completion** date (not including change orders);

(2) Remove 15% overhead and profit from the calculation in item (1) by dividing the results of item (1) by 1.15;

(3) Multiply the result of item (2) by 7.25% for the total home office overhead;

(4) Multiply the result of item (3) by 7.25% for the total profit; and

(5) The total extended home office overhead will be the total of items (3) and (4).

11.7.2 Recoverable Subcontractor Costs. When the **Work** is performed by a **Subcontractor**, the **Contractor** may be paid the actual and necessary costs of such subcontracted **Work** as outlined above in Articles 11.7.1.1 through 11.7.1.8, and an additional overhead of 5% of the costs outlined in Articles 11.7.1.1 through 11.7.1.3.

11.7.3 Non-Recoverable Costs. The parties agree that the **City** will have no liability for the following items and the **Contractor** agrees it shall make no claim for the following items:

11.7.3.1 Profit, or loss of anticipated or unanticipated profit, except as provided in Article 11.7.1.9;

11.7.3.2 Consequential damages, including, but not limited to, construction or bridge loans or interest paid on such loans, loss of bonding capacity, bidding opportunities, or interest in investment, or any resulting insolvency;

11.7.3.3 Indirect costs or expenses of any nature except those included in Article 11.7.1;

11.7.3.4 Direct or indirect costs attributable to performance of **Work** where the **Contractor**, because of situations or conditions within its control, has not progressed the **Work** in a satisfactory manner; and

11.7.3.5 Attorneys' fees and dispute and claims preparation expenses.

11.8 Any claims for delay under this Article 11 are not subject to the jurisdiction of the Contract Dispute Resolution Board pursuant to the dispute resolution process set forth in Article 27.

11.9 Any compensation provided to the **Contractor** in accordance with this Article 11 will be made pursuant to a claim filed with the **Comptroller**. Nothing in this Article 11 extends the time for the **Contractor** to file an action with respect to a claim within six months after **Substantial Completion** pursuant to Article 56.

ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS

12.1 During the progress of the **Work**, **Other Contractors** may be engaged in performing other work or may be awarded other contracts for additional work on this **Project**. In that event, the **Contractor** shall coordinate the **Work** to be done hereunder with the work of such **Other Contractors** and the **Contractor** shall fully cooperate with such **Other Contractors** and carefully fit its own **Work** to that provided under other contracts as may be directed by the **Engineer**. The **Contractor** shall not commit or permit any act which will interfere with the performance of work by any **Other Contractors**.

12.2 If the **Engineer** determines that the **Contractor** is failing to coordinate its **Work** with the work of **Other Contractors** as the **Engineer** has directed, then the **Commissioner** shall have the right to withhold any payments otherwise due hereunder until the **Contractor** completely complies with the **Engineer's** directions.

12.3 The **Contractor** shall notify the **Engineer** in writing if any **Other Contractor** on this **Project** is failing to coordinate its work with the **Work** of this **Contract**. If the **Engineer** finds such charges to be true, the **Engineer** shall promptly issue such directions to the **Other Contractor** with respect thereto as the situation may require. The **City** shall not, however, be liable for any damages suffered by any **Other Contractor's** failure to coordinate its work with the **Work** of this **Contract** or by reason of the **Other Contractor's** failure to promptly comply with the directions so issued by the **Engineer**, or by reason of any **Other Contractor's** default in performance, it being understood that the **City** does not guarantee the responsibility or continued efficiency of any contractor. The **Contractor** agrees to make no claim against the **City** for any damages relating to or arising out of any directions issued by the **Engineer** pursuant to this Article 12 (including but not limited to the failure of any **Other Contractor** to comply or promptly comply with such directions), or the failure of any **Other Contractor** to coordinate its work, or the default in performance of any **Other Contractor**.

12.4 The **Contractor** shall indemnify and hold the **City** harmless from any and all claims or judgments for damages and from costs and expenses to which the **City** may be subjected or which it may suffer or incur by reason of the **Contractor's** failure to comply with the **Engineer's** directions promptly; and the **Comptroller** shall have the right to exercise the powers reserved in Article 23 with respect to any claims which may be made for damages due to the **Contractor's** failure to comply with the **Engineer's** directions promptly. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.5 Should the **Contractor** sustain any damage through any act or omission of any **Other Contractor** having a contract with the **City** for the performance of work upon the **Site** or of work which may be necessary to be performed for the proper prosecution of the **Work** to be performed hereunder, or through any act or omission of a subcontractor of such **Other Contractor**, the **Contractor** shall have no claim against the **City** for such damage, but shall have a right to recover such damage from the **Other**

Contractor under the provision similar to the following provisions which apply to this **Contract** and have been or will be inserted in the contracts with such **Other Contractors**:

12.5.1 Should any **Other Contractor** having or who shall hereafter have a contract with the **City** for the performance of work upon the **Site** sustain any damage through any act or omission of the **Contractor** hereunder or through any act or omission of any **Subcontractor** of the **Contractor**, the **Contractor** agrees to reimburse such **Other Contractor** for all such damages and to defend at its own expense any action based upon such claim and if any judgment or claim (even if the allegations of the action are without merit) against the **City** shall be allowed the **Contractor** shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and agrees to indemnify and hold the **City** harmless from all such claims. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.6 The **City's** right to indemnification hereunder shall in no way be diminished, waived or discharged by its recourse to assessment of liquidated damages as provided in Article 15, or by the exercise of any other remedy provided for by **Contract** or by **Law**.

ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE

13.1 If performance by the **Contractor** is delayed for a reason set forth in Article 13.3, the **Contractor** may be allowed a reasonable extension of time in conformance with this Article 13 and the **PPB** Rules.

13.2 Any extension of time may be granted only by the **ACCO** or by the Board for the Extension of Time (hereafter "Board") (as set forth below) upon written application by the **Contractor**.

13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

13.3.1 By the acts or omissions of the **City**, its officials, agents or employees; or

13.3.2 By the act or omissions of **Other Contractors** on this **Project**; or

13.3.3 By supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, excessive inclement weather, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes not brought about by any act or omission of the **Contractor**).

13.3.4 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

13.4 The **Contractor** shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the **Work** as determined by the **ACCO** or the Board, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the **Contractor** or of its **Subcontractors** or **Materialmen**, and would of itself (irrespective

of the concurrent causes) have delayed the **Work**, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.

13.5 The determination made by the **ACCO** or the Board on an application for an extension of time shall be binding and conclusive on the **Contractor**.

13.6 The **ACCO** or the Board acting entirely within their discretion may grant an application for an extension of time for causes of delay other than those herein referred.

13.7 Permitting the **Contractor** to continue with the **Work** after the time fixed for its completion has expired, or after the time to which such completion may have been extended has expired, or the making of any payment to the **Contractor** after such time, shall in no way operate as a waiver on the part of the **City** of any of its rights under this **Contract**.

13.8 Application for Extension of Time:

13.8.1 Before the **Contractor's** time extension request will be considered, the **Contractor** shall notify the **ACCO** of the condition which allegedly has caused or is causing the delay, and shall submit a written application to the **ACCO** identifying:

13.8.1(a) The **Contractor**; the registration number; and **Project** description;

13.8.1(b) Liquidated damage assessment rate, as specified in the **Contract**;

13.8.1(c) Original total bid price;

13.8.1(d) The original **Contract** start date and completion date;

13.8.1(e) Any previous time extensions granted (number and duration); and

13.8.1(f) The extension of time requested.

13.8.2 In addition, the application for extension of time shall set forth in detail:

13.8.2(a) The nature of each alleged cause of delay in completing the **Work**;

13.8.2(b) The date upon which each such cause of delay began and ended and the number of **Days** attributable to each such cause;

13.8.2(c) A statement that the **Contractor** waives all claims except for those delineated in the application, and the particulars of any claims which the **Contractor** does not agree to waive. For time extensions for **Substantial Completion** and final completion payments, the application shall include a detailed statement of the dollar amounts of each element of claim item reserved; and

13.8.2(d) A statement indicating the **Contractor's** understanding that the time extension is granted only for purposes of permitting continuation of **Contract** performance and payment for **Work** performed and that the **City** retains its right to conduct an investigation and assess liquidated damages as appropriate in the future.

13.9 Analysis and Approval of Time Extensions:

13.9.1 For time extensions for partial payments, a written determination shall be made by the **ACCO** who may, for good and sufficient cause, extend the time for the performance of the **Contract** as follows:

13.9.1(a) If the **Work** is to be completed within six (6) months, the time for performance may be extended for sixty (60) **Days**;

13.9.1(b) If the **Work** is to be completed within less than one (1) year but more than six (6) months, an extension of ninety (90) **Days** may be granted;

13.9.1(c) If the **Contract** period exceeds one (1) year, besides the extension granted in Article 13.9.1(b), an additional thirty (30) **Days** may be granted for each multiple of six (6) months involved beyond the one (1) year period; or

13.9.1(d) If exceptional circumstances exist, the **ACCO** may extend the time for performance beyond the extensions in Articles 13.9.1(a), 13.9.1(b), and 13.9.1(c). In that event, the **ACCO** shall file with the Mayor's Office of Contract Services a written explanation of the exceptional circumstances.

13.9.2 For extensions of time for **Substantial Completion** and final completion payments, the **Engineer**, in consultation with the **ACCO**, shall prepare a written analysis of the delay (including a preliminary determination of the causes of delay, the beginning and end dates for each such cause of delay, and whether the delays are excusable under the terms of this **Contract**). The report shall be subject to review by and approval of the Board, which shall have authority to question its analysis and determinations and request additional facts or documentation. The report as reviewed and made final by the Board shall be made a part of the **Agency** contract file. Neither the report itself nor anything contained therein shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

13.9.3 Approval Mechanism for Time Extensions for **Substantial Completion** or Final Completion Payments: An extension shall be granted only with the approval of the Board which is comprised of the **ACCO** of the **Agency**, the **City** Corporation Counsel, and the **Comptroller**, or their authorized representatives.

13.9.4 Neither the granting of any application for an extension of time to the **Contractor** or any **Other Contractor** on this **Project** nor the papers, records or reports related to any application for or grant of an extension of time or determination related thereto shall be referred to or offered in evidence by the **Contractor** or its attorneys in any action or proceeding.

13.10 No Damage for Delay: The **Contractor** agrees to make no claim for damages for delay in the performance of this **Contract** occasioned by any act or omission to act of the **City** or any of its representatives, except as provided for in Article 11.

ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK

14.1 Date for **Substantial Completion**: The **Contractor** shall substantially complete the **Work** within the time fixed in Schedule A of the General Conditions, or within the time to which such **Substantial Completion** may be extended.

14.2 Determining the Date of **Substantial Completion**: The **Work** will be deemed to be substantially complete when the two conditions set forth below have been met.

14.2.1 Inspection: The **Engineer** or **Resident Engineer**, as applicable, has inspected the **Work** and has made a written determination that it is substantially complete.

14.2.2 Approval of **Final Approved Punch List** and Date for **Final Acceptance**: Following inspection of the **Work**, the **Engineer/Resident Engineer** shall furnish the **Contractor** with a final punch list, specifying all items of **Work** to be completed and proposing dates for the completion of each specified item of **Work**. The **Contractor** shall then submit in writing to the **Engineer/Resident Engineer** within ten (10) **Days** of the **Engineer/Resident Engineer** furnishing the final punch list either acceptance of the dates or proposed alternative dates for the completion of each specified item of **Work**. If the **Contractor** neither accepts the dates nor proposes alternative dates within ten (10) **Days**, the schedule proposed by the **Engineer/Resident Engineer** shall be deemed accepted. If the **Contractor** proposes alternative dates, then, within a reasonable time after receipt, the **Engineer/Resident Engineer**, in a written notification to the **Contractor**, shall approve the **Contractor's** completion dates or, if they are unable to agree, the **Engineer/Resident Engineer** shall establish dates for the completion of each item of **Work**. The latest completion date specified shall be the date for **Final Acceptance** of the **Work**.

14.3 Date of **Substantial Completion**. The date of approval of the **Final Approved Punch List**, shall be the date of **Substantial Completion**. The date of approval of the **Final Approved Punch List** shall be either (a) if the **Contractor** approves the final punch list and proposed dates for completion furnished by the **Engineer/Resident Engineer**, the date of the **Contractor**'s approval; or (b) if the **Contractor** neither accepts the dates nor proposes alternative dates, ten (10) **Days** after the **Engineer/Resident Engineer** furnishes the **Contractor** with a final punch list and proposed dates for completion; or (c) if the **Contractor** proposes alternative dates, the date that the **Engineer/Resident Engineer** sends written notification to the **Contractor** either approving the **Contractor**'s proposed alternative dates or establishing dates for the completion for each item of **Work**.

14.4 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer**'s/**Resident Engineer**'s inspection if, upon such inspection, the **Engineer/Resident Engineer** finds that all items on the **Final Approved Punch List** are complete and no further **Work** remains to be done. The **Commissioner** will then issue a written determination of **Final Acceptance**.

14.5 Request for Inspection: Inspection of the **Work** by the **Engineer/Resident Engineer** for the purpose of **Substantial Completion** or **Final Acceptance** shall be made within fourteen (14) **Days** after receipt of the **Contractor's** written request therefor.

14.6 Request for Re-inspection: If upon inspection for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** determines that there are items of **Work** still to be performed, the **Contractor** shall promptly perform them and then request a re-inspection. If upon re-inspection, the **Engineer/Resident Engineer** determines that the **Work** is substantially complete or finally accepted, the date of such re-inspection shall be the date of **Substantial Completion** or **Final Acceptance**. Re-inspection by the **Engineer/Resident Engineer** shall be made within ten (10) **Days** after receipt of the **Contractor's** written request therefor.

14.7 Initiation of Inspection by the **Engineer/Resident Engineer**: If the **Contractor** does not request inspection or re-inspection of the **Work** for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** may initiate such inspection or re-inspection.

ARTICLE 15. LIQUIDATED DAMAGES

15.1 In the event the **Contractor** fails to substantially complete the **Work** within the time fixed for such **Substantial Completion** in Schedule A of the General Conditions, plus authorized time extensions, or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the sum fixed in Schedule A of the General Conditions, for each and every **Day** that the time consumed in substantially completing the **Work** exceeds the time allowed therefor; which said sum, in view of the difficulty of accurately ascertaining the loss which the **City** will suffer by reason of delay in the **Substantial Completion** of the **Work** hereunder, is hereby fixed and agreed as the liquidated damages that the **City** will suffer by reason of such delay, and not as a penalty. This Article 15 shall also apply to the **Contractor** whether or not the **Contractor** is defaulted pursuant to Chapter X of this **Contract**. Neither the failure to assess liquidated damages nor the granting of any time extension shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

15.2 Liquidated damages received hereunder are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the **City's** right to indemnification, or the **Contractor's** obligation to indemnify the **City**, or to any other remedy provided for in this **Contract** or by **Law**.

15.3 The **Commissioner** may deduct and retain out of the monies which may become due hereunder, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the **City**, the **Contractor** shall be liable to pay the difference.

ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION

16.1 Unless otherwise provided for in the **Specifications**, the **Commissioner** may take over, use, occupy or operate any part of the **Work** at any time prior to **Final Acceptance**, upon written notification to the **Contractor**. The **Engineer** or **Resident Engineer**, as applicable, shall inspect the part of the **Work** to be taken over, used, occupied, or operated, and will furnish the **Contractor** with a written statement of the **Work**, if any, which remains to be performed on such part. The **Contractor** shall not object to, nor interfere with, the **Commissioner's** decision to exercise the rights granted by Article 16. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work:**

16.1.1 the **Engineer/Resident Engineer** shall issue a written determination of **Substantial Completion** with respect to such part of the **Work**;

16.1.2 the **Contractor** shall be relieved of its absolute obligation to protect such part of the unfinished **Work** in accordance with Article 7;

16.1.3 the **Contractor's** guarantee on such part of the **Work** shall begin on the date of such use by the **City**; and;

16.1.4 the **Contractor** shall be entitled to a return of so much of the amount retained in accordance with Article 21 as it relates to such part of the **Work**, except so much thereof as may be retained under Articles 24 and 44.

CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17. SUBCONTRACTS

17.1 The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price fixed in Schedule A of the General Conditions, without prior written permission from the **Commissioner**. All subcontracts made by the **Contractor** shall be in writing. No **Work** may be performed by a **Subcontractor** prior to the **Contractor** entering into a written subcontract with the **Subcontractor** and complying with the provisions of this Article 17.

17.2 Before making any subcontracts, the **Contractor** shall submit a written statement to the **Commissioner** giving the name and address of the proposed **Subcontractor**; the portion of the **Work** and materials which it is to perform and furnish; the cost of the subcontract; the VENDEX questionnaire if required; the proposed subcontract if requested by the **Commissioner**; and any other information tending to prove that the proposed **Subcontractor** has the necessary facilities, skill, integrity, past experience, and financial resources to perform the **Work** in accordance with the terms and conditions of this **Contract**.

17.3 In addition to the requirements in Article 17.2, **Contractor** is required to list the **Subcontractor** in the web based Subcontractor Reporting System through the City's Payee Information Portal (PIP), available at www.nyc.gov/pip.[1] For each **Subcontractor** listed, **Contractor** is required to provide the following information: maximum contract value, description of **Subcontractor's** Work, start and end date of the subcontract and identification of the **Subcontractor**'s industry. Thereafter, **Contractor** will be required to report in the system the payments made to each **Subcontractor** within 30 days of making the payment. If any of the required information changes throughout the Term of the **Contract**, **Contractor** will be required to revise the information in the system.

Failure of the **Contractor** to list a **Subcontractor** and/or to report **Subcontractor** payments in a timely fashion may result in the **Commissioner** declaring the **Contractor** in default of the **Contract** and will subject **Contractor** to liquidated damages in the amount of $100 per day for each day that the **Contractor** fails to identify a **Subcontractor** along with the required information about the **Subcontractor** and/or fails to report payments to a **Subcontractor**, beyond the time frames set forth herein or in the notice from the **City**. Article 15 shall govern the issue of liquidated damages.

17.4 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed sub-subcontract shall be submitted in the same manner as directed above.

17.5 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is approved. If the proposed **Subcontractor** is not approved, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted to enter or perform any work on the **Site** unless approved.

17.6 Before entering into any subcontract hereunder, the **Contractor** shall provide the proposed **Subcontractor** with a complete copy of this document and inform the proposed **Subcontractor** fully and completely of all provisions and requirements of this **Contract** relating either directly or indirectly to the **Work** to be performed and the materials to be furnished under such subcontract, and every such

[1] In order to use the new system, a PIP account will be required. Detailed instructions on creating a PIP account and using the new system are also available at www.nyc.gov/pip. Additional assistance with PIP may be obtained by emailing the Financial Information Services Agency Help Desk at pip@fisa.nyc.gov.

Subcontractor shall expressly stipulate that all labor performed and materials furnished by the **Subcontractor** shall strictly comply with the requirements of this **Contract**.

17.7 Documents given to a prospective **Subcontractor** for the purpose of soliciting the **Subcontractor's** bid shall include either a copy of the bid cover or a separate information sheet setting forth the **Project** name, the **Contract** number (if available), the **Agency** (as noted in Article 2.1.6), and the **Project's** location.

17.8 The **Commissioner's** approval of a **Subcontractor** shall not relieve the **Contractor** of any of its responsibilities, duties, and liabilities hereunder. The **Contractor** shall be solely responsible to the **City** for the acts or defaults of its **Subcontractor** and of such **Subcontractor's** officers, agents, and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the **Contractor** to the extent of its subcontract.

17.9 If the **Subcontractor** fails to maintain the necessary facilities, skill, integrity, past experience, and financial resources (other than due to the **Contractor's** failure to make payments where required) to perform the **Work** in accordance with the terms and conditions of this **Contract**, the **Contractor** shall promptly notify the **Commissioner** and replace such **Subcontractor** with a newly approved **Subcontractor** in accordance with this Article 17.

17.10 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** maintain all insurance required by **Law**.

17.11 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy of the subcontract and its cost. The subcontract shall provide the following:

17.11.1 Payment to **Subcontractors**: The agreement between the **Contractor** and its **Subcontractor** shall contain the same terms and conditions as to method of payment for **Work**, labor, and materials, and as to retained percentages, as are contained in this **Contract**.

17.11.2 Prevailing Rate of Wages: The agreement between the **Contractor** and its **Subcontractor** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.11.3 Section 6-123 of the Administrative Code: Pursuant to the requirements of Section 6-123 of the Administrative Code, every agreement between the **Contractor** and a **Subcontractor** in excess of fifty thousand ($50,000) dollars shall include a provision that the **Subcontractor** shall not engage in any unlawful discriminatory practice as defined in Title VIII of the Administrative Code (Section 8-101 *et seq*.).

17.11.4 All requirements required pursuant to federal and/or state grant agreement(s), if applicable to the **Work**.

17.12 The **Commissioner** may deduct from the amounts certified under this **Contract** to be due to the **Contractor**, the sum or sums due and owing from the **Contractor** to the **Subcontractors** according to the terms of the said subcontracts, and in case of dispute between the **Contractor** and its **Subcontractor**, or **Subcontractors**, as to the amount due and owing, the **Commissioner** may deduct and withhold from the amounts certified under this **Contract** to be due to the **Contractor** such sum or sums as may be claimed by such **Subcontractor**, or **Subcontractors**, in a sworn affidavit, to be due and owing until such time as such claim or claims shall have been finally resolved.

17.13 On contracts where performance bonds and payment bonds are executed, the **Contractor** shall include on each requisition for payment the following data: **Subcontractor's** name, value of the subcontract, total amount previously paid to **Subcontractor** for **Work** previously requisitioned, and the amount, including retainage, to be paid to the **Subcontractor** for **Work** included in the requisition.

17.14 On **Contracts** where performance bonds and payment bonds are not executed, the **Contractor** shall include with each requisition for payment submitted hereunder, a signed statement from each and every **Subcontractor** and/or **Materialman** for whom payment is requested in such requisition. Such signed statement shall be on the letterhead of the **Subcontractor** and/or **Materialman** for whom payment is requested and shall (i) verify that such **Subcontractor** and/or **Materialman** has been paid in full for all **Work** performed and/or material supplied to date, exclusive of any amount retained and any amount included on the current requisition, and (ii) state the total amount of retainage to date, exclusive of any amount retained on the current requisition.

ARTICLE 18. ASSIGNMENTS

18.1 The **Contractor** shall not assign, transfer, convey or otherwise dispose of this **Contract**, or the right to execute it, or the right, title or interest in or to it or any part thereof, or assign, by power of attorney or otherwise any of the monies due or to become due under this **Contract**, unless the previous written consent of the **Commissioner** shall first be obtained thereto, and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments.

18.2 Such assignment, transfer, conveyance or other disposition of this **Contract** shall not be valid until filed in the office of the **Commissioner** and the **Comptroller**, with the written consent of the **Commissioner** endorsed thereon or attached thereto.

18.3 Failure to obtain the previous written consent of the **Commissioner** to such an assignment, transfer, conveyance or other disposition, may result in the revocation and annulment of this **Contract**. The **City** shall thereupon be relieved and discharged from any further liability to the **Contractor**, its assignees, transferees or sublessees, who shall forfeit and lose all monies therefor earned under the **Contract**, except so much as may be required to pay the **Contractor's** employees.

18.4 The provisions of this clause shall not hinder, prevent, or affect an assignment by the **Contractor** for the benefit of its creditors made pursuant to the **Laws** of the State of New York.

18.5 This **Contract** may be assigned by the **City** to any corporation, agency or instrumentality having authority to accept such assignment.

CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE

ARTICLE 19. SECURITY DEPOSIT

19.1 If performance and payment bonds are required, the **City** shall retain the bid security to ensure that the successful bidder executes the **Contract** and furnishes the required payment and performance security within ten (10) **Days** after notice of the award of the **Contract**. If the successful bidder fails to execute the **Contract** and furnish the required payment and performance security, the **City** shall retain such bid security as set forth in the Information for Bidders. If the successful bidder executes the

Contract and furnishes the required payment and performance security, the **City** shall return the bid security within a reasonable time after the furnishing of such bonds and execution of the **Contract** by the **City**.

19.2 If performance and payment bonds are not required, the bid security shall be retained by the **City** as security for the **Contractor**'s faithful performance of the **Contract**. If partial payments are provided, the bid security will be returned to the **Contractor** after the sum retained under Article 21 equals the amount of the bid security, subject to other provisions of this **Contract**. If partial payments are not provided, the bid security will be released when final payment is certified by the **City** for payment.

19.3 If the **Contractor** is declared in default under Article 48 prior to the return of the deposit, or if any claim is made such as referred to in Article 23, the amount of such deposit, or so much thereof as the **Comptroller** may deem necessary, may be retained and then applied by the **Comptroller**:

19.3.1 To compensate the **City** for any expense, loss or damage suffered or incurred by reason of or resulting from such default, including the cost of re-letting and liquidated damages; or

19.3.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where one hundred (100%) percent performance bonds and payment bonds are executed, this Article 20 does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond or where the **Contract** does not require a payment bond for one hundred (100%) percent of the **Contract** price, the **City** shall, in accordance with the terms of this Article 20, guarantee payment of all lawful claims for:

20.2.1 Wages and compensation for labor performed and/or services rendered; and

20.2.2 Materials, equipment, and supplies provided, whether incorporated into the **Work** or not, when demands have been filed with the **City** as provided hereinafter by any person, firm, or corporation which furnished labor, material, equipment, supplies, or any combination thereof, in connection with the **Work** performed hereunder (hereinafter referred to as the "beneficiary") at the direction of the **City** or the **Contractor**.

20.3 The provisions of Article 20.2 are subject to the following limitations and conditions:

20.3.1 If the **Contractor** provides a payment bond for a value that is less than one hundred (100%) percent of the value of the **Contract Work**, the payment bond provided by the **Contractor** shall be primary (and non-contributing) to the payment guarantee provided under this Article 20.

20.3.2 The guarantee is made for the benefit of all beneficiaries as defined in Article 20.2 provided that those beneficiaries strictly adhere to the terms and conditions of Article 20.3.4 and 20.3.5.

20.3.3 Nothing in this Article 20 shall prevent a beneficiary providing labor, services or material for the **Work** from suing the **Contractor** for any amounts due and owing the beneficiary by the **Contractor**.

20.3.4 Every person who has furnished labor or material, to the **Contractor** or to a **Subcontractor** of the **Contractor**, in the prosecution of the **Work** and who has not been paid in full therefor before the expiration of a period of ninety (90) **Days** after the date on which the last of the labor was performed or material was furnished by him/her for which the claim is made, shall have the right to sue on this payment guarantee in his/her own name for the amount, or the balance thereof, unpaid at the time of commencement of the action; provided, however, that a person having a direct contractual relationship with a **Subcontractor** of the **Contractor** but no contractual relationship express or implied with the **Contractor** shall not have a right of action upon the guarantee unless he/she shall have given written notice to the **Contractor** within one hundred twenty (120) **Days** from the date on which the last of the labor was performed or the last of the material was furnished, for which his/her claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or for whom the labor was performed. The notice shall be served by delivering the same personally to the **Contractor** or by mailing the same by registered mail, postage prepaid, in an envelope addressed to the **Contractor** at any place where it maintains an office or conducts its business; provided, however, that where such notice is actually received by the **Contractor** by other means, such notice shall be deemed sufficient.

20.3.5 Except as provided in Labor Law Section 220-g, no action on this payment guarantee shall be commenced after the expiration of the one-year limitations period set forth in Section 137(4)(b) of the State Finance Law.

20.3.6 The **Contractor** shall promptly forward to the **City** any notice or demand received pursuant to Article 20.3.4. The **Contractor** shall inform the **City** of any defenses to the notice or demand and shall forward to the **City** any documents the **City** requests concerning the notice or demand.

20.3.7 All demands made against the **City** by a beneficiary of this payment guarantee shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems reasonably appropriate or necessary, which may include, but shall not be limited to: the subcontract; any invoices presented to the **Contractor** for payment; the notarized statement of the beneficiary that the demand is due and payable, that a request for payment has been made of the **Contractor** and that the demand has not been paid by the **Contractor** within the time allowed for such payment by the subcontract; and copies of any correspondence between the beneficiary and the **Contractor** concerning such demand. The **City** shall notify the **Contractor** that a demand has been made. The **Contractor** shall inform the **City** of any defenses to the demand and shall forward to the **City** any documents the **City** requests concerning the demand.

20.3.8 The **City** shall make payment only if, after considering all defenses presented by the **Contractor**, it determines that the payment is due and owing to the beneficiary making the demand.

20.3.9 No beneficiary shall be entitled to interest from the **City**, or to any other costs, including, but not limited to, attorneys' fees, except to the extent required by State Finance Law Section 137.

20.4 Upon the receipt by the **City** of a demand pursuant to this Article 20, the **City** may withhold from any payment otherwise due and owing to the **Contractor** under this **Contract** an amount sufficient to satisfy the demand.

20.4.1 In the event the **City** determines that the demand is valid, the **City** shall notify the **Contractor** of such determination and the amount thereof and direct the **Contractor** to immediately pay such amount to the beneficiary. In the event the **Contractor**, within seven (7) **Days** of receipt of such notification from the **City**, fails to pay the beneficiary, such failure shall constitute an automatic and irrevocable assignment of payment by the **Contractor** to the beneficiary for the amount of the demand determined by the **City** to be valid. The **Contractor**, without further notification or other process, hereby gives its unconditional consent to such assignment of payment to the beneficiary and authorizes the **City**, on its behalf, to take all necessary actions to implement such assignment of payment, including without limitation the execution of any instrument or documentation necessary to effectuate such assignment.

20.4.2 In the event that the amount otherwise due and owing to the **Contractor** by the **City** is insufficient to satisfy such demand, the **City** may, at its option, require payment from the **Contractor** of an amount sufficient to cover such demand and exercise any other right to require or recover payment which the **City** may have under **Law** or **Contract**.

20.4.3 In the event the **City** determines that the demand is invalid, any amount withheld pending the **City**'s review of such demand shall be paid to the **Contractor**; provided, however, no lien has been filed. In the event a claim or an action has been filed, the terms and conditions set forth in Article 23 shall apply. In the event a lien has been filed, the parties will be governed by the provisions of the Lien Law of the State of New York.

20.5 The provisions of this Article 20 shall not prevent the **City** and the **Contractor** from resolving disputes in accordance with the **PPB** Rules, where applicable.

20.6 In the event the **City** determines that the beneficiary is entitled to payment pursuant to this Article 20, such determination and any defenses and counterclaims raised by the **Contractor** shall be taken into account in evaluating the **Contractor's** performance.

20.7 Nothing in this Article 20 shall relieve the **Contractor** of the obligation to pay the claims of all persons with valid and lawful claims against the **Contractor** relating to the **Work**.

20.8 The **Contractor** shall not require any performance, payment or other bonds of any **Subcontractor** if this **Contract** does not require such bonds of the **Contractor**.

20.9 The payment guarantee made pursuant to this Article 20 shall be construed in a manner consistent with Section 137 of the State Finance Law and shall afford to persons furnishing labor or materials to the **Contractor** or its **Subcontractors** in the prosecution of the **Work** under this **Contract** all of the rights and remedies afforded to such persons by such section, including but not limited to, the right to commence an action against the **City** on the payment guarantee provided by this Article 20 within the one-year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires one hundred (100%) percent performance and payment security, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and

retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.2 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded does not exceed one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded exceeds one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract,** the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, up to ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher. The percentage to be retained is set forth in Schedule A of the General Conditions.

ARTICLE 22. INSURANCE

22.1 Types of Insurance: The **Contractor** shall procure and maintain the following types of insurance if, and as indicated, in Schedule A of the General Conditions (with the minimum limits and special conditions specified in Schedule A). Such insurance shall be maintained from the date the **Contractor** is required to provide Proof of Insurance pursuant to Article 22.3.1 through the date of completion of all required **Work** (including punch list work as certified in writing by the **Resident Engineer**), except for insurance required pursuant to Article 22.1.4, which may terminate upon **Substantial Completion** of the **Contract**. All insurance shall meet the requirements set forth in this Article 22. Wherever this Article requires that insurance coverage be "at least as broad" as a specified form (including all ISO forms), there is no obligation that the form itself be used, provided that the **Contractor** can demonstrate that the alternative form or endorsement contained in its policy provides coverage at least as broad as the specified form.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide Commercial General Liability Insurance covering claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this insurance shall be at least as broad as that provided by the latest edition of Insurance Services Office ("ISO") Form CG 0001. Such insurance shall be "occurrence" based rather than "claims-made" and include, without limitation, the following types of coverage: premises operations; products and completed operations; contractual liability (including the tort liability of another assumed in a contract); broad form property damage; independent contractors; explosion, collapse and underground (XCU); construction means and methods; and incidental malpractice. Such insurance shall contain a "per project" aggregate limit, as specified in Schedule A, that applies separately to operations under this **Contract**.

22.1.1(a) Such Commercial General Liability Insurance shall name the **City** as an Additional Insured. Coverage for the City shall specifically include the **City's** officials and employees, be at least as broad as the latest edition of ISO Form CG 20 10 and provide completed operations coverage at least as broad as the latest edition of ISO Form CG 20 37.

22.1.1(b) Such Commercial General Liability Insurance shall name all other entities designated as additional insureds in Schedule A but only for claims arising from the

Contractor's operations under this **Contract**, with coverage at least as broad as the latest edition of ISO Form CG 20 26.

22.1.1(c) If the **Work** requires a permit from the Department of Buildings pursuant to 1 RCNY Section 101-08, the **Contractor** shall provide Commercial General Liability Insurance with limits of at least those required by 1 RCNY section 101-08 or greater limits required by the Agency in accordance with Schedule A. If the **Work** does not require such a permit, the minimum limits shall be those provided for in Schedule A.

22.1.1(d) If any of the **Work** includes repair of a waterborne vessel owned by or to be delivered to the **City**, such Commercial General Liability shall include, or be endorsed to include, Ship Repairer's Legal Liability Coverage to protect against, without limitation, liability arising from navigation of such vessels prior to delivery to and acceptance by the **City**.

22.1.2 Workers' Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance: The **Contractor** shall provide, and shall cause its **Subcontractors** to provide, Workers Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance in accordance with the **Laws** of the State of New York on behalf of all employees providing services under this **Contract** (except for those employees, if any, for which the **Laws** require insurance only pursuant to Article 22.1.3).

22.1.3 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: If specified in Schedule A of the General Conditions or if required by **Law**, the **Contractor** shall provide insurance in accordance with the United States Longshoremen's and Harbor Workers Act and/or the Jones Act, on behalf of all qualifying employees providing services under this **Contract**.

22.1.4 Builders Risk Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall provide Builders Risk Insurance on a completed value form for the total value of the **Work** through **Substantial Completion** of the **Work** in its entirety. Such insurance shall be provided on an All Risk basis and include coverage, without limitation, for windstorm (including named windstorm), storm surge, flood and earth movement. Unless waived by the **Commissioner**, it shall include coverage for ordinance and law, demolition and increased costs of construction, debris removal, pollutant clean up and removal, and expediting costs. Such insurance shall cover, without limitation, (a) all buildings and/or structures involved in the **Work**, as well as temporary structures at the **Site**, and (b) any property that is intended to become a permanent part of such building or structure, whether such property is on the **Site**, in transit or in temporary storage. Policies shall name the **Contractor** as Named Insured and list the **City** as both an Additional Insured and a Loss Payee as its interest may appear.

22.1.4(a) Policies of such insurance shall specify that, in the event a loss occurs at an occupied facility, occupancy of such facility is permitted without the consent of the issuing insurance company.

22.1.4(b) Such insurance may be provided through an Installation Floater, at the **Contractor's** option, if it otherwise conforms with the requirements of this Article 22.1.4.

22.1.5 Commercial Automobile Liability Insurance: The **Contractor** shall provide Commercial Automobile Liability Insurance for liability arising out of ownership,

maintenance or use of any owned (if any), non-owned and hired vehicles to be used in connection with this **Contract**. Coverage shall be at least as broad as the latest edition of ISO Form CA0001. If vehicles are used for transporting hazardous materials, the Automobile Liability Insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90.

22.1.6 Contractors Pollution Liability Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Contractors Pollution Liability Insurance covering bodily injury and property damage. Such insurance shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants (including asbestos), including any loss, cost or expense incurred as a result of any cleanup of pollutants (including asbestos) or in the investigation, settlement or defense of any claim, action, or proceedings arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured and any other entity specified in Schedule A. Coverage shall include, without limitation, (a) loss of use of damaged property or of property that has not been physically injured, (b) transportation, and (c) non-owned disposal sites.

22.1.6(a) Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees and be at least as broad as provided to the **Contractor** for this **Project**.

22.1.6(b) If such insurance is written on a claims-made policy, such policy shall have a retroactive date on or before the effective date of this **Contract**, and continuous coverage shall be maintained, or an extended discovery period exercised, for a period of not less than three (3) years from the time the **Work** under this **Contract** is completed.

22.1.7 Marine Insurance:

22.1.7(a) Marine Protection and Indemnity Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Protection and Indemnity Insurance with coverage at least as broad as Form SP-23. The insurance shall provide coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured for bodily injury and property damage arising from marine operations under this **Contract**. Coverage shall include, without limitation, injury or death of crew members (if not fully provided through other insurance), removal of wreck, damage to piers, wharves and other fixed or floating objects and loss of or damage to any other vessel or craft, or to property on such other vessel or craft.

22.1.7(b) Hull and Machinery Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Hull and Machinery Insurance with coverage for the **Contractor** or **Subcontractor** (whichever is doing this Work) and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the latest edition of American Institute Tug Form for all tugs used under this

Contract and Collision Liability at least as broad as the latest edition of American Institute Hull Clauses.

22.1.7(c) Marine Pollution Liability Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Pollution Liability Insurance covering itself (or the Subcontractor doing such Work) as Named Insured and the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured. Coverage shall be at least as broad as that provided by the latest edition of Water Quality Insurance Syndicate Form and include, without limitation, liability arising from the discharge or substantial threat of a discharge of oil, or from the release or threatened release of a hazardous substance including injury to, or economic losses resulting from, the destruction of or damage to real property, personal property or natural resources.

22.1.8 The **Contractor** shall provide such other types of insurance, at such minimum limits and with such conditions, as are specified in Schedule A of the General Conditions.

22.2 General Requirements for Insurance Coverage and Policies:

22.2.1 All required insurance policies shall be maintained with companies that may lawfully issue the required policy and have an A.M. Best rating of at least A-/VII or a Standard and Poor's rating of at least A, unless prior written approval is obtained from the **City** Corporation Counsel.

22.2.2 The **Contractor** shall be solely responsible for the payment of all premiums for all required policies and all deductibles and self-insured retentions to which such policies are subject, whether or not the **City** is an insured under the policy.

22.2.3 In his/her sole discretion, the **Commissioner** may, subject to the approval of the **Comptroller** and the **City** Corporation Counsel, accept Letters of Credit and/or custodial accounts in lieu of required insurance.

22.2.4 The **City's** limits of coverage for all types of insurance required pursuant to Schedule A of the General Conditions shall be the greater of (i) the minimum limits set forth in Schedule A or (ii) the limits provided to the **Contractor** as Named Insured under all primary, excess, and umbrella policies of that type of coverage.

22.2.5 The **Contractor** may satisfy its insurance obligations under this Article 22 through primary policies or a combination of primary and excess/umbrella policies, so long as all policies provide the scope of coverage required herein.

22.2.6 Policies of insurance provided pursuant to this Article 22 shall be primary and non-contributing to any insurance or self-insurance maintained by the **City**.

22.3 Proof of Insurance:

22.3.1 For all types of insurance required by Article 22.1 and Schedule A, except for insurance required by Articles 22.1.4 and 22.1.7, the **Contractor** shall file proof of insurance in accordance with this Article 22.3 within ten (10) **Days** of award. For insurance

provided pursuant to Articles 22.1.4 and 22.1.7, proof shall be filed by a date specified by the **Commissioner** or ten (10) **Days** prior to the commencement of the portion of the **Work** covered by such policy, whichever is earlier.

22.3.2 For Workers' Compensation Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit one of the following forms: C-105.2 Certificate of Workers' Compensation Insurance; U-26.3 - State Insurance Fund Certificate of Workers' Compensation Insurance; Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. For Disability Benefits Insurance provided pursuant to Article 22.1.2, the Contractor shall submit DB-120.1 - Certificate Of Insurance Coverage Under The NYS Disability Benefits Law, Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. ACORD forms are not acceptable.

22.3.3 For policies provided pursuant to all of Article 22.1 other than Article 22.1.2, the **Contractor** shall submit one or more Certificates of Insurance on forms acceptable to the **Commissioner**. All such Certificates of Insurance shall certify (a) the issuance and effectiveness of such policies of insurance, each with the specified minimum limits (b) for insurance secured pursuant to Article 22.1.1 that the **City** and any other entity specified in Schedule A is an Additional Insured thereunder; (c) in the event insurance is required pursuant to Article 22.1.6 and/or Article 22.1.7, that the City is an Additional Insured thereunder; (d) the company code issued to the insurance company by the National Association of Insurance Commissioners (the NAIC number); and (e) the number assigned to the **Contract** by the **City**. All such Certificates of Insurance shall be accompanied by either a duly executed "Certification by Insurance Broker or Agent" in the form contained in Part III of Schedule A or copies of all policies referenced in such Certificate of Insurance as certified by an authorized representative of the issuing insurance carrier. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

22.3.4 Documentation confirming renewals of insurance shall be submitted to the **Commissione**r prior to the expiration date of coverage of policies required under this **Contract**. Such proofs of insurance shall comply with the requirements of Articles 22.3.2 and 22.3.3.

22.3.5 The **Contractor** shall be obligated to provide the **City** with a copy of any policy of insurance provided pursuant to this Article 22 upon the demand for such policy by the **Commissioner** or the **City** Corporation Counsel.

22.4 Operations of the **Contractor**:

22.4.1 The **Contractor** shall not commence the **Work** unless and until all required certificates have been submitted to and accepted by the **Commissioner**. Acceptance by the **Commissioner** of a certificate does not excuse the **Contractor** from securing insurance consistent with all provisions of this Article 22 or of any liability arising from its failure to do so.

22.4.2 The **Contractor** shall be responsible for providing continuous insurance coverage in the manner, form, and limits required by this **Contract** and shall be authorized to perform **Work** only during the effective period of all required coverage.

22.4.3 In the event that any of the required insurance policies lapse, are revoked, suspended or otherwise terminated, for whatever cause, the **Contractor** shall immediately stop all **Work**, and shall not recommence **Work** until authorized in writing to do so by the **Commissioner**. Upon quitting the **Site**, except as otherwise directed by the **Commissioner**, the **Contractor** shall leave all plant, materials, equipment, tools, and supplies on the **Site**. **Contract** time shall continue to run during such periods and no extensions of time will be granted. The **Commissioner** may also declare the **Contractor** in default for failure to maintain required insurance.

22.4.4 In the event the **Contractor** receives notice, from an insurance company or other person, that any insurance policy required under this Article 22 shall be cancelled or terminated (or has been cancelled or terminated) for any reason, the **Contractor** shall immediately forward a copy of such notice to both the **Commissioner** and the New York City Comptroller, attn: Office of Contract Administration, Municipal Building, One Centre Street, room 1005, New York, New York 10007. Notwithstanding the foregoing, the **Contractor** shall ensure that there is no interruption in any of the insurance coverage required under this Article 22.

22.4.5 Where notice of loss, damage, occurrence, accident, claim or suit is required under an insurance policy maintained in accordance with this Article 22, the **Contractor** shall notify in writing all insurance carriers that issued potentially responsive policies of any such event relating to any operations under this **Contract** (including notice to Commercial General Liability insurance carriers for events relating to the **Contractor**'s own employees) no later than 20 days after such event. For any policy where the **City** is an Additional Insured, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Insured as well as the Named Insured." Such notice shall also contain the following information: the number of the insurance policy, the name of the named insured, the date and location of the damage, occurrence, or accident, and the identity of the persons or things injured, damaged or lost. The **Contractor** shall simultaneously send a copy of such notice to the City of New York c/o Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

22.4.6 In the event of any loss, accident, claim, action, or other event that does or can give rise to a claim under any insurance policy required under this Article 22, the **Contractor** shall at all times fully cooperate with the **City** with regard to such potential or actual claim.

22.5 **Subcontractor** Insurance: In the event the **Contractor** requires any **Subcontractor** to procure insurance with regard to any operations under this **Contract** and requires such **Subcontractor** to name the **Contractor** as an **Additional Insured** thereunder, the **Contractor** shall ensure that the **Subcontractor** name the **City**, including its officials and employees, as an Additional Insured with coverage at least as broad as the most recent edition of ISO Form CG 20 26.

22.6 Wherever reference is made in Article 7 or this Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth in Schedule A of the General Conditions. In the event no address is set forth in Schedule A, such documents are to be sent to the **Commissioner's** address as provided elsewhere in this **Contract**.

22.7 Apart from damages or losses covered by insurance provided pursuant to Articles 22.1.2, 22.1.3, or 22.1.5, the **Contractor** waives all rights against the **City**, including its officials and employees, for any damages or losses that are covered under any insurance required under this Article 22 (whether or

not such insurance is actually procured or claims are paid thereunder) or any other insurance applicable to the operations of the **Contractor** and/or its employees, agents, or **Subcontractors**.

22.8 In the event the **Contractor** utilizes a self-insurance program to satisfy any of the requirements of this Article 22, the **Contractor** shall ensure that any such self-insurance program provides the **City** with all rights that would be provided by traditional insurance under this Article 22, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

22.9 Materiality/Non-Waiver: The **Contractor's** failure to secure policies in complete conformity with this Article 22, or to give an insurance company timely notice of any sort required in this **Contract** or to do anything else required by this Article 22 shall constitute a material breach of this **Contract**. Such breach shall not be waived or otherwise excused by any action or inaction by the **City** at any time.

22.10 Pursuant to General Municipal Law Section 108, this **Contract** shall be void and of no effect unless **Contractor** maintains Workers' Compensation Insurance for the term of this **Contract** to the extent required and in compliance with the New York State Workers' Compensation Law.

22.11 Other Remedies: Insurance coverage provided pursuant to this Article 22 or otherwise shall not relieve the **Contractor** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions available to it under any other provisions of this **Contract** or **Law**.

ARTICLE 23. MONEY RETAINED AGAINST CLAIMS

23.1 If any claim shall be made by any person or entity (including **Other Contractors** with the **City** on this **Project**) against the **City** or against the **Contractor** and the **City** for any of the following:

(a) An alleged loss, damage, injury, theft or vandalism of any of the kinds referred to in Articles 7 and 12, plus the reasonable costs of defending the **City**, which in the opinion of the **Comptroller** may not be paid by an insurance company (for any reason whatsoever); or

(b) An infringement of copyrights, patents or use of patented articles, tools, etc., as referred to in Article 57; or

(c) Damage claimed to have been caused directly or indirectly by the failure of the **Contractor** to perform the **Work** in strict accordance with this **Contract,**

the amount of such claim, or so much thereof as the **Comptroller** may deem necessary, may be withheld by the **Comptroller**, as security against such claim, from any money due hereunder. The **Comptroller**, in his/her discretion, may permit the **Contractor** to substitute other satisfactory security in lieu of the monies so withheld.

23.2 If an action on such claim is timely commenced and the liability of the **City**, or the **Contractor**, or both, shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the **Contractor** to be valid, the **Comptroller** shall pay such judgment or admitted claim out of the monies retained by the **Comptroller** under the provisions of this Article 23, and return the balance, if any, without interest, to the **Contractor**.

ARTICLE 24. MAINTENANCE AND GUARANTY

24.1 The **Contractor** shall promptly repair, replace, restore or rebuild, as the **Commissioner** may determine, any finished **Work** in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of **Substantial Completion** (or use and occupancy in accordance with Article 16), except where other periods of maintenance and guaranty are provided for in Schedule A.

24.2 As security for the faithful performance of its obligations hereunder, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to one (1%) percent of the price (or the amount fixed in Schedule A of the General Conditions) in cash or certified check upon a state or national bank and trust company or a check of such bank and trust company signed by a duly authorized officer thereof and drawn to the order of the **Comptroller**, or obligations of the **City**, which the **Comptroller** may approve as of equal value with the sum so required.

24.3 In lieu of the above, the **Contractor** may make such security payment to the **City** by authorizing the **Commissioner** in writing to deduct the amount from the **Substantial Completion** payment which shall be deemed the deposit required above.

24.4 If the **Contractor** has faithfully performed all of its obligations hereunder the **Commissioner** shall so certify to the **Comptroller** within five (5) **Days** after the expiration of one (1) year from the date of **Substantial Completion** and acceptance of the **Work** or within thirty (30) **Days** after the expiration of the guarantee period fixed in the **Specifications**. The security payment shall be repaid to the **Contractor** without interest within thirty (30) **Days** after certification by the **Commissioner** to the **Comptroller** that the **Contractor** has faithfully performed all of its obligations hereunder.

24.5 Notice by the **Commissioner** to the **Contractor** to repair, replace, rebuild or restore such defective or damaged **Work** shall be timely, pursuant to this article, if given not later than ten (10) **Days** subsequent to the expiration of the one (1) year period or other periods provided for herein.

24.6 If the **Contractor** shall fail to repair, replace, rebuild or restore such defective or damaged **Work** promptly after receiving such notice, the **Commissioner** shall have the right to have the **Work** done by others in the same manner as provided for in the completion of a defaulted **Contract**, under Article 51.

24.7 If the security payment so deposited is insufficient to cover the cost of such **Work**, the **Contractor** shall be liable to pay such deficiency on demand by the **Commissioner**.

24.8 The **Engineer's** certificate setting forth the fair and reasonable cost of repairing, replacing, rebuilding or restoring any damaged or defective **Work** when performed by one other than the **Contractor**, shall be binding and conclusive upon the **Contractor** as to the amount thereof.

24.9 The **Contractor** shall obtain all manufacturers' warranties and guaranties of all equipment and materials required by this **Contract** in the name of the **City** and shall deliver same to the **Commissioner**. All of the **City's** rights and title and interest in and to said manufacturers' warranties and guaranties may be assigned by the **City** to any subsequent purchasers of such equipment and materials or lessees of the premises into which the equipment and materials have been installed.

CHAPTER VI: CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM

ARTICLE 25. CHANGES

25.1 Changes may be made to this **Contract** only as duly authorized in writing by the **Commissioner** in accordance with the **Law** and this **Contract**. All such changes, modifications, and amendments will become a part of the **Contract**. **Work** so ordered shall be performed by the **Contractor**.

25.2 **Contract** changes will be made only for **Work** necessary to complete the **Work** included in the original scope of the **Contract** and/or for non-material changes to the scope of the **Contract**. Changes are not permitted for any material alteration in the scope of **Work** in the **Contract**.

25.3 The **Contractor** shall be entitled to a price adjustment for **Extra Work** performed pursuant to a written change order. Adjustments to price shall be computed in one or more of the following ways:

25.3.1 By applicable unit prices specified in the **Contract**; and/or

25.3.2 By agreement of a fixed price; and/or

25.3.3 By time and material records; and/or

25.3.4 In any other manner approved by the **CCPO**.

25.4 All payments for change orders are subject to pre-audit by the **Engineering Audit Officer** and may be post-audited by the **Comptroller** and/or the **Agency**.

ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK

26.1 Overrun of Unit Price Item: An overrun is any quantity of a unit price item which the **Contractor** is directed to provide which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule.

26.1.1For any unit price item, the **Contractor** will be paid at the unit price bid for any quantity up to one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule. If during the progress of the **Work**, the actual quantity of any unit price item required to complete the **Work** approaches the estimated quantity for that item, and for any reason it appears that the actual quantity of any unit price item necessary to complete the **Work** will exceed the estimated quantity for that item by twenty-five (25%) percent, the **Contractor** shall immediately notify the **Engineer** of such anticipated overrun. The **Contractor** shall not be compensated for any quantity of a unit price item provided which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule without written authorization from the **Engineer**.

26.1.2 If the actual quantity of any unit price item necessary to complete the **Work** will exceed one hundred twenty five (125%) percent of the estimated quantity for that item set forth in the bid schedule, the **City** reserves the right and the **Contractor** agrees to negotiate a new unit price for such item. In no event shall such negotiated new unit price exceed the unit bid price. If the **City** and **Contractor** cannot agree on a new unit price, then the **City** shall order the **Contractor** and the **Contractor** agrees to provide additional quantities of

the item on the basis of time and material records for the actual and reasonable cost as determined under Article 26.2, but in no event at a unit price exceeding the unit price bid.

26.2 **Extra Work:** For **Extra Work** where payment is by agreement on a fixed price in accordance with Article 25.3.2, the price to be paid for such **Extra Work** shall be based on the fair and reasonable estimated cost of the items set forth below. For **Extra Work** where payment is based on time and material records in accordance with Article 25.3.3, the price to be paid for such **Extra Work** shall be the actual and reasonable cost of the items set forth below, calculated in accordance with the formula specified therein, if any.

26.2.1 Necessary materials (including transportation to the **Site**); plus

26.2.2 Necessary direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits; plus

26.2.3 Sales and personal property taxes, if any, required to be paid on materials not incorporated into such **Extra Work**; plus

26.2.4 Reasonable rental value of **Contractor**-owned (or **Subcontractor**-owned, as applicable), necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per operating hour: (.035) x (HP rating) x (Fuel cost/gallon). Reasonable rental value is defined as the lower of either seventy-five percent of the monthly prorated rental rates established in "The AED Green Book, Rental Rates and Specifications for Construction Equipment" published by Equipment Watch (the "Green Book"), or seventy-five percent of the monthly prorated rental rates established in the "Rental Rate Blue Book for Construction Equipment" published by Equipment Watch (the "Blue Book") (the applicable Blue Book rate being for rental only without the addition of any operational costs listed in the Blue Book). The reasonable rental value is deemed to be inclusive of all operating costs except for fuel/energy consumption and equipment operator's wages/costs. For multiple shift utilization, reimbursement shall be calculated as follows: first shift shall be seventy-five (75%) percent of such rental rates; second shift shall be sixty (60%) percent of the first shift rate; and third shift shall be forty (40%) percent of the first shift rate. Equipment on standby shall be reimbursed at one-third (1/3) the prorated monthly rental rate. **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment includes equipment from rental companies affiliated with or controlled by the **Contractor** (or **Subcontractor**, as applicable)**,** as determined by the **Commissioner**. In establishing cost reimbursement for non-operating **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment (scaffolding, sheeting systems, road plates, etc.), the **City** may restrict reimbursement to a purchase-salvage/life cycle basis if less than the computed rental costs; plus

26.2.5 Necessary installation and dismantling of such plant and equipment, including transportation to and from the **Site**, if any, provided that, in the case of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) equipment rented from a third party, the cost of installation and dismantling are not allowable if such costs are included in the rental rate; plus

26.2.6 Necessary fees charged by governmental entities; plus

26.2.7 Necessary construction-related service fees charged by non-governmental entities, such as landfill tipping fees; plus

26.2.8 Reasonable rental costs of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per hour of operation: (.035) x (HP rating) x (Fuel cost/gallon). In lieu of renting, the **City** reserves the right to direct the purchase of non-operating equipment (scaffolding, sheeting systems, road plates, etc.), with payment on a purchase-salvage/life cycle basis, if less than the projected rental costs; plus

26.2.9 Workers' Compensation Insurance, and any insurance coverage expressly required by the **City** for the performance of the **Extra Work** which is different than the types of insurance required by Article 22 and Schedule A of the General Conditions. The cost of Workers' Compensation Insurance is subject to applicable payroll limitation caps and shall be based upon the carrier's Manual Rate for such insurance derived from the applicable class Loss Cost ("LC") and carrier's Lost Cost Multiplier ("LCM") approved by the New York State Department of Financial Services, and with the exception of experience rating, rate modifiers as promulgated by the New York Compensation Insurance Rating Board ("NYCIRB"); plus

26.2.10 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.11 Twelve percent (12%) percent of the total of items in Articles 26.2.1 through 26.2.5 as compensation for overhead, except that no percentage for overhead will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes. Overhead shall include without limitation, all costs and expenses in connection with administration, management superintendence, small tools, and insurance required by Schedule A of the General Conditions other than Workers' Compensation Insurance; plus

26.2.12 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus the items in Article 26.2.11, as compensation for profit, except that no percentage for profit will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes; plus

26.2.13 Five (5%) percent of the total of items in Articles 26.2.6 through 26.2.10 as compensation for overhead and profit.

26.3 Where the **Extra Work** is performed in whole or in part by other than the **Contractor's** own forces pursuant to Article 26.2, the **Contractor** shall be paid, subject to pre-audit by the **Engineering Audit Officer**, the cost of such **Work** computed in accordance with Article 26.2 above, plus an additional allowance of five (5%) percent to cover the **Contractor's** overhead and profit.

26.4 Where a change is ordered, involving both **Extra Work** and omitted or reduced **Contract Work,** the **Contract** price shall be adjusted, subject to pre-audit by the **EAO**, in an amount based on the difference between the cost of such **Extra Work** and of the omitted or reduced **Work**.

26.5 Where the **Contractor** and the **Commissioner** can agree upon a fixed price for **Extra Work** in accordance with Article 25.3.2 or another method of payment for **Extra Work** in accordance with

Article 25.3.4, or for **Extra Work** ordered in connection with omitted **Work**, such method, subject to pre-audit by the **EAO**, may, at the option of the **Commissioner**, be substituted for the cost plus a percentage method provided in Article 26.2; provided, however, that if the **Extra Work** is performed by a **Subcontractor**, the **Contractor** shall not be entitled to receive more than an additional allowance of five (5%) percent for overhead and profit over the cost of such **Subcontractor's Work** as computed in accordance with Article 26.2.

ARTICLE 27. RESOLUTION OF DISPUTES

27.1 All disputes between the **City** and the **Contractor** of the kind delineated in this Article 27.1 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this Article 27 and the **PPB** Rules. This procedure for resolving all disputes of the kind delineated herein shall be the exclusive means of resolving any such disputes.

27.1.1 This Article 27 shall not apply to disputes concerning matters dealt with in other sections of the **PPB** Rules, or to disputes involving patents, copyrights, trademarks, or trade secrets (as interpreted by the courts of New York State) relating to proprietary rights in computer software.

27.1.2 This Article 27 shall apply only to disputes about the scope of **Work** delineated by the **Contract**, the interpretation of **Contract** documents, the amount to be paid for **Extra Work** or disputed work performed in connection with the **Contract**, the conformity of the **Contractor's Work** to the **Contract**, and the acceptability and quality of the **Contractor's Work**; such disputes arise when the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** makes a determination with which the **Contractor** disagrees.

27.2 All determinations required by this Article 27 shall be made in writing clearly stated, with a reasoned explanation for the determination based on the information and evidence presented to the party making the determination. Failure to make such determination within the time required by this Article 27 shall be deemed a non-determination without prejudice that will allow application to the next level.

27.3 During such time as any dispute is being presented, heard, and considered pursuant to this Article 27, the **Contract** terms shall remain in force and the **Contractor** shall continue to perform **Work** as directed by the **ACCO** or the **Engineer**. Failure of the **Contractor** to continue **Work** as directed shall constitute a waiver by the **Contractor** of its claim.

27.4 Presentation of Disputes to **Commissioner**.

Notice of Dispute and Agency Response. The **Contractor** shall present its dispute in writing ("Notice of Dispute") to the **Commissioner** within thirty (30) Days of receiving written notice of the determination or action that is the subject of the dispute. This notice requirement shall not be read to replace any other notice requirements contained in the **Contract**. The Notice of Dispute shall include all the facts, evidence, documents, or other basis upon which the **Contractor** relies in support of its position, as well as a detailed computation demonstrating how any amount of money claimed by the **Contractor** in the dispute was arrived at. Within thirty (30) Days after receipt of the detailed written submission comprising the complete Notice of Dispute, the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** shall submit to the **Commissioner** all materials he or she deems pertinent to the dispute. Following initial submissions to the **Commissioner**, either party may demand of the other the production of any document or other material the demanding party believes may be relevant to the dispute. The requested party shall produce all relevant materials that are not otherwise

protected by a legal privilege recognized by the courts of New York State. Any question of relevancy shall be determined by the **Commissioner** whose decision shall be final. Willful failure of the **Contractor** to produce any requested material whose relevancy the **Contractor** has not disputed, or whose relevancy has been affirmatively determined, shall constitute a waiver by the **Contractor** of its claim.

27.4.1 **Commissioner** Inquiry. The **Commissioner** shall examine the material and may, in his or her discretion, convene an informal conference with the **Contractor**, the **ACCO**, and the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** to resolve the issue by mutual consent prior to reaching a determination. The **Commissioner** may seek such technical or other expertise as he or she shall deem appropriate, including the use of neutral mediators, and require any such additional material from either or both parties as he or she deems fit. The **Commissioner's** ability to render, and the effect of, a decision hereunder shall not be impaired by any negotiations in connection with the dispute presented, whether or not the **Commissioner** participated therein. The **Commissioner** may or, at the request of any party to the dispute, shall compel the participation of any **Other Contractor** with a contract related to the **Work** of this **Contract**, and that **Contractor** shall be bound by the decision of the **Commissioner**. Any **Other Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this Article 27 as the **Contractor** initiating the dispute.

27.4.2 **Commissioner** Determination. Within thirty (30) **Days** after the receipt of all materials and information, or such longer time as may be agreed to by the parties, the **Commissioner** shall make his or her determination and shall deliver or send a copy of such determination to the **Contractor**, the **ACCO,** and **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner**, as applicable, together with a statement concerning how the decision may be appealed.

27.4.3 Finality of **Commissioner's** Decision. The **Commissioner's** decision shall be final and binding on all parties, unless presented to the Contract Dispute Resolution Board pursuant to this Article 27. The **City** may not take a petition to the Contract Dispute Resolution Board. However, should the **Contractor** take such a petition, the **City** may seek, and the Contract Dispute Resolution Board may render, a determination less favorable to the **Contractor** and more favorable to the **City** than the decision of the **Commissioner**.

27.5 Presentation of Dispute to the **Comptroller**. Before any dispute may be brought by the **Contractor** to the Contract Dispute Resolution Board, the **Contractor** must first present its claim to the **Comptroller** for his or her review, investigation, and possible adjustment.

27.5.1 Time, Form, and Content of Notice. Within thirty (30) **Days** of its receipt of a decision by the **Commissioner,** the **Contractor** shall submit to the **Comptroller** and to the **Commissioner** a Notice of Claim regarding its dispute with the **Agency**. The Notice of Claim shall consist of (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written decision of the **Commissioner**; and (iii) a copy of all materials submitted by the **Contractor** to the **Agency**, including the Notice of Dispute. The **Contractor** may not present to the **Comptroller** any material not presented to the **Commissioner**, except at the request of the **Comptroller**.

27.5.2 Response. Within thirty (30) **Days** of receipt of the Notice of Claim, the **Agency** shall make available to the **Comptroller** a copy of all material submitted by the **Agency** to the **Commissioner** in connection with the dispute. The **Agency** may not present to the **Comptroller** any material not presented to the **Commissioner** except at the request of the **Comptroller**.

27.5.3 **Comptroller** Investigation. The **Comptroller** may investigate the claim in dispute and, in the course of such investigation, may exercise all powers provided in Sections 7-201 and 7-203 of the Administrative Code. In addition, the **Comptroller** may demand of either party, and such party shall provide, whatever additional material the **Comptroller** deems pertinent to the claim, including original business records of the **Contractor**. Willful failure of the **Contractor** to produce within fifteen (15) **Days** any material requested by the **Comptroller** shall constitute a waiver by the **Contractor** of its claim. The **Comptroller** may also schedule an informal conference to be attended by the **Contractor**, **Agency** representatives, and any other personnel desired by the **Comptroller**.

27.5.4 Opportunity of **Comptroller** to Compromise or Adjust Claim. The **Comptroller** shall have forty-five (45) **Days** from his or her receipt of all materials referred to in Article 27.5.3 to investigate the disputed claim. The period for investigation and compromise may be further extended by agreement between the **Contractor** and the **Comptroller**, to a maximum of ninety (90) **Days** from the **Comptroller's** receipt of all materials. The **Contractor** may not present its petition to the Contract Dispute Resolution Board until the period for investigation and compromise delineated in this Article 27.5.4 has expired. In compromising or adjusting any claim hereunder, the **Comptroller** may not revise or disregard the terms of the **Contract** between the parties.

27.6 Contract Dispute Resolution Board. There shall be a Contract Dispute Resolution Board composed of:

27.6.1 The chief administrative law judge of the Office of Administrative Trials and Hearings (OATH) or his/her designated OATH administrative law judge, who shall act as chairperson, and may adopt operational procedures and issue such orders consistent with this Article 27 as may be necessary in the execution of the Contract Dispute Resolution Board's functions, including, but not limited to, granting extensions of time to present or respond to submissions;

27.6.2 The **CCPO** or his/her designee; any designee shall have the requisite background to consider and resolve the merits of the dispute and shall not have participated personally and substantially in the particular matter that is the subject of the dispute or report to anyone who so participated; and

27.6.3 A person with appropriate expertise who is not an employee of the **City**. This person shall be selected by the presiding administrative law judge from a prequalified panel of individuals, established and administered by OATH with appropriate background to act as decision-makers in a dispute. Such individual may not have a contract or dispute with the **City** or be an officer or employee of any company or organization that does, or regularly represents persons, companies, or organizations having disputes with the **City**.

27.7 Petition to the Contract Dispute Resolution Board. In the event the claim has not been settled or adjusted by the **Comptroller** within the period provided in this Article 27, the **Contractor**,

within thirty (30) **Days** thereafter, may petition the Contract Dispute Resolution Board to review the **Commissioner's** determination.

27.7.1 Form and Content of Petition by **Contractor**. The **Contractor** shall present its dispute to the Contract Dispute Resolution Board in the form of a petition, which shall include (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed, and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written Decision of the **Commissioner,** (iii) copies of all materials submitted by the **Contractor** to the Agency; (iv) a copy of the written decision of the **Comptroller**, if any, and (v) copies of all correspondence with, or written material submitted by the **Contractor**, to the **Comptroller**. The **Contractor** shall concurrently submit four (4) complete sets of the Petition: one set to the **City** Corporation Counsel (Attn: Commercial and Real Estate Litigation Division) and three (3) sets to the Contract Dispute Resolution Board at OATH's offices with proof of service on the **City** Corporation Counsel. In addition, the **Contractor** shall submit a copy of the written statement of the substance of the dispute, cited in (i) above, to both the **Commissioner** and the **Comptroller**.

27.7.2 **Agency** Response. Within thirty (30) **Days** of its receipt of the Petition by the **City** Corporation Counsel, the **Agency** shall respond to the brief written statement of the **Contractor** and make available to the Contract Dispute Resolution Board all material it submitted to the **Commissioner** and **Comptroller**. Three (3) complete copies of the **Agency** response shall be provided to the Contract Dispute Resolution Board and one to the **Contractor**. Extensions of time for submittal of the **Agency** response shall be given as necessary upon a showing of good cause or, upon consent of the parties, for an initial period of up to thirty (30) Days.

27.7.3 Further Proceedings. The Contract Dispute Resolution Board shall permit the **Contractor** to present its case by submission of memoranda, briefs, and oral argument. The Contract Dispute Resolution Board shall also permit the **Agency** to present its case in response to the **Contractor** by submission of memoranda, briefs, and oral argument. If requested by the **City** Corporation Counsel, the **Comptroller** shall provide reasonable assistance in the preparation of the **Agency's** case. Neither the **Contractor** nor the **Agency** may support its case with any documentation or other material that was not considered by the **Comptroller**, unless requested by the Contract Dispute Resolution Board. The Contract Dispute Resolution Board, in its discretion, may seek such technical or other expert advice as it shall deem appropriate and may seek, on its own or upon application of a party, any such additional material from any party as it deems fit. The Contract Dispute Resolution Board, in its discretion, may combine more than one dispute between the parties for concurrent resolution.

27.7.4 Contract Dispute Resolution Board Determination. Within forty-five (45) **Days** of the conclusion of all written submissions and oral arguments, the Contract Dispute Resolution Board shall render a written decision resolving the dispute. In an unusually complex case, the Contract Dispute Resolution Board may render its decision in a longer period, not to exceed ninety (90) **Days**, and shall so advise the parties at the commencement of this period. The Contract Dispute Resolution Board's decision must be consistent with the terms of the **Contract**. Decisions of the Contract Dispute Resolution Board shall only resolve matters before the Contract Dispute Resolution Board and shall not have precedential effect with respect to matters not before the Contract Dispute Resolution Board.

27.7.5 Notification of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board shall send a copy of its decision to the **Contractor**, the **ACCO**, the Engineer, the **Comptroller**, the **City** Corporation Counsel, the CCPO, and the **PPB**. A decision in favor of the **Contractor** shall be subject to the prompt payment provisions of the **PPB** Rules. The Required Payment Date shall be thirty (30) Days after the date the parties are formally notified of the Contract Dispute Resolution Board's decision.

27.7.6 Finality of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board's decision shall be final and binding on all parties. Any party may seek review of the Contract Dispute Resolution Board's decision solely in the form of a challenge, filed within four (4) months of the date of the Contract Dispute Resolution Board's decision, in a court of competent jurisdiction of the State of New York, County of New York pursuant to Article 78 of the Civil Practice Law and Rules. Such review by the court shall be limited to the question of whether or not the Contract Dispute Resolution Board's decision was made in violation of lawful procedure, was affected by an error of **Law**, or was arbitrary and capricious or an abuse of discretion. No evidence or information shall be introduced or relied upon in such proceeding that was not presented to the Contract Dispute Resolution Board in accordance with this Article 27.

27.8 Any termination, cancellation, or alleged breach of the **Contract** prior to or during the pendency of any proceedings pursuant to this Article 27 shall not affect or impair the ability of the **Commissioner** or Contract Dispute Resolution Board to make a binding and final decision pursuant to this Article 27.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON A TIME & MATERIALS BASIS

28.1 While the **Contractor** or any of its **Subcontractors** is performing **Work** on a time and material basis or **Extra Work** on a time and material basis ordered by the **Commissioner** under Article 25, or where the **Contractor** believes that it or any of its **Subcontractors** is performing **Extra Work** but a final determination by **Agency** has not been made, or the **Contractor** or any of its **Subcontractors** is performing disputed **Work** (whether on or off the **Site**), or complying with a determination or order under protest in accordance with Articles 11, 27, and 30, in each such case the **Contractor** shall furnish the **Resident Engineer** daily with three (3) copies of written statements signed by the **Contractor's** representative at the **Site** showing:

28.1.1 The name, trade, and number of each worker employed on such **Work** or engaged in complying with such determination or order, the number of hours employed, and the character of the **Work** each is doing; and

28.1.2 The nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such **Work** or compliance with such determination or order, and from whom purchased or rented.

28.2 A copy of such statement will be countersigned by the **Resident Engineer**, noting thereon any items not agreed to or questioned, and will be returned to the **Contractor** within two (2) **Days** after submission.

28.3 The **Contractor** and its **Subcontractors**, when required by the **Commissioner**, or the **Comptroller**, shall also produce for inspection, at the office of the **Contractor** or **Subcontractor**, any and all of its books, bid documents, financial statements, vouchers, records, daily job diaries and reports,

and cancelled checks, and any other documents relating to showing the nature and quantity of the labor, materials, plant and equipment actually used in the performance of such **Work**, or in complying with such determination or order, and the amounts expended therefor, and shall permit the **Commissioner** and the **Comptroller** to make such extracts therefrom, or copies thereof, as they or either of them may desire.

28.4 In connection with the examination provided for herein, the **Commissioner**, upon demand therefor, will produce for inspection by the **Contractor** such records as the **Agency** may have with respect to such **Extra Work** or disputed **Work** performed under protest pursuant to order of the **Commissioner**, except those records and reports which may have been prepared for the purpose of determining the accuracy and validity of the **Contractor's** claim.

28.5 Failure to comply strictly with these requirements shall constitute a waiver of any claim for extra compensation or damages on account of the performance of such **Work** or compliance with such determination or order.

ARTICLE 29. OMITTED WORK

29.1 If any **Contract Work** in a lump sum **Contract**, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid **Contract** is omitted by the **Commissioner** pursuant to Article 33, the **Contract** price, subject to audit by the EAO, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of **Work** omitted subject to Article 29.4. For the purpose of determining the pro rata portion of the lump sum bid amount, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be the determining factor.

29.2 If the whole of a lump sum item or units of any other item is so omitted by the **Commissioner** in a unit price, lump sum, or percentage-bid **Contract**, then no payment will be made therefor except as provided in Article 29.4.

29.3 For units that have been ordered but are only partially completed, the unit price shall be reduced by a pro rata portion of the unit price bid based upon the percentage of **Work** omitted subject to Article 29.4.

29.4 In the event the **Contractor**, with respect to any omitted **Work**, has purchased any non-cancelable material and/or equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated into the **Work**, the **Contractor** shall be paid for such material and/or equipment in accordance with Article 64.2.1(b); provided, however, such payment is contingent upon the **Contractor's** delivery of such material and/or equipment in acceptable condition to a location designated by the **City**.

29.5 The **Contractor** agrees to make no claim for damages or for loss of overhead and profit with regard to any omitted **Work**.

ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS

30.1 If the **Contractor** shall claim to be sustaining damages by reason of any act or omission of the **City** or its agents, it shall submit to the **Commissioner** within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter to the extent additional damages are being incurred for the same condition, verified statements of the details and the amounts of such

damages, together with documentary evidence of such damages. The **Contractor** may submit any of the above statements within such additional time as may be granted by the **Commissioner** in writing upon written request therefor. Failure of the **Commissioner** to respond in writing to a written request for additional time within thirty (30) **Days** shall be deemed a denial of the request. On failure of the **Contractor** to strictly comply with the foregoing provisions, such claims shall be deemed waived and no right to recover on such claims shall exist. Damages that the **Contractor** may claim in any action or dispute resolution procedure arising under or by reason of this **Contract** shall not be different from or in excess of the statements and documentation made pursuant to this Article 30. This Article 30.1 does not apply to claims submitted to the **Commissioner** pursuant to Article 11 or to claims disputing a determination under Article 27.

30.2 In addition to the foregoing statements, the **Contractor** shall, upon notice from the **Commissioner**, produce for examination at the **Contractor's** office, by the **Engineer**, **Architect** or **Project Manager**, all of its books of account, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**, and submit itself and persons in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.3 In addition to the statements required under Article 28 and this Article 30, the **Contractor** and/or its **Subcontractor** shall, within thirty (30) **Days** upon notice from the **Commissioner** or **Comptroller**, produce for examination at the **Contractor's** and/or **Subcontractor's** office, by a representative of either the **Commissioner** or **Comptroller**, all of its books of account, bid documents, financial statements, accountant workpapers, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**. Further, the **Contractor** and/or its **Subcontractor** shall submit any person in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.4 Unless the information and examination required under Article 30.3 is provided by the **Contractor** and/or its **Subcontractor** upon thirty (30) **Days'** notice from the **Commissioner** or **Comptroller**, or upon the **Commissioner's** or **Comptroller's** written authorization to extend the time to comply, the **City** shall be released from all claims arising under, relating to or by reason of this **Contract**, except for sums certified by the **Commissioner** to be due under the provisions of this **Contract**. It is further stipulated and agreed that no person has the power to waive any of the foregoing provisions and that in any action or dispute resolution procedure against the **City** to recover any sum in excess of the sums certified by the **Commissioner** to be due under or by reason of this **Contract**, the **Contractor** must allege in its complaint and prove, at trial or during such dispute resolution procedure, compliance with the provisions of this Article 30.

30.5 In addition, after the commencement of any action or dispute resolution procedure by the **Contractor** arising under or by reason of this **Contract**, the **City** shall have the right to require the **Contractor** to produce for examination under oath, up until the trial of the action or hearing before the Contract Dispute Resolution Board, the books and documents described in Article 30.3 and submit itself and all persons in its employ for examination under oath. If this Article 30 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute resolution procedure.

CHAPTER VII: POWERS OF THE RESIDENT ENGINEER,THE ENGINEER OR ARCHITECT AND THE COMMISSIONER

ARTICLE 31. THE RESIDENT ENGINEER

31.1 The **Resident Engineer** shall have the power to inspect, supervise, and control the performance of the **Work**, subject to review by the **Commissioner**. The **Resident Engineer** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER

32.1 The **Engineer** or **Architect** or **Project Manager**, in addition to those matters elsewhere herein delegated to the **Engineer** and expressly made subject to his/her determination, direction or approval, shall have the power, subject to review by the **Commissioner**:

32.1.1 To determine the amount, quality, and location of the **Work** to be paid for hereunder; and

32.1.2 To determine all questions in relation to the **Work**, to interpret the **Contract Drawings**, **Specifications**, and **Addenda**, and to resolve all patent inconsistencies or ambiguities therein; and

32.1.3 To determine how the **Work** of this **Contract** shall be coordinated with **Work** of **Other Contractors** engaged simultaneously on this **Project**, including the power to suspend any part of the **Work**, but not the whole thereof; and

32.1.4 To make minor changes in the **Work** as he/she deems necessary, provided such changes do not result in a net change in the cost to the **City** or to the **Contractor** of the **Work** to be done under the **Contract**; and

32.1.5 To amplify the **Contract Drawings**, add explanatory information and furnish additional **Specifications** and drawings, consistent with this **Contract**.

32.2 The foregoing enumeration shall not imply any limitation upon the power of the **Engineer** or **Architect** or **Project Manager**, for it is the intent of this **Contract** that all of the **Work** shall generally be subject to his/her determination, direction, and approval, except where the determination, direction or approval of someone other than the **Engineer** or **Architect** or **Project Manager** is expressly called for herein.

32.3 The **Engineer** or **Architect** or **Project Manager** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 33. THE COMMISSIONER

33.1 The **Commissioner**, in addition to those matters elsewhere herein expressly made subject to his/her determination, direction or approval, shall have the power:

33.1.1 To review and make determinations on any and all questions in relation to this **Contract** and its performance; and

33.1.2 To modify or change this **Contract** so as to require the performance of **Extra Work** (subject, however, to the limitations specified in Article 25) or the omission of **Contract Work**; and

33.1.3 To suspend the whole or any part of the **Work** whenever in his/her judgment such suspension is required:

33.1.3(a) In the interest of the **City** generally; or

33.1.3(b) To coordinate the **Work** of the various contractors engaged on this **Project** pursuant to the provisions of Article 12; or

33.1.3(c) To expedite the completion of the entire **Project** even though the completion of this particular **Contract** may thereby be delayed.

ARTICLE 34. NO ESTOPPEL

34.1 Neither the **City** nor any **Agency**, official, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this **Contract** by the **City**, the **Commissioner**, the **Engineer**, the **Resident Engineer**, or any other official, agent or employee of the **City**, either before or after the final completion and acceptance of the **Work** and payment therefor:

34.1.1 From showing the true and correct classification, amount, quality or character of the **Work** actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in any particular, or that the **Work**, or any part thereof, does not in fact conform to the requirements of this **Contract**; and

34.1.2 From demanding and recovering from the **Contractor** any overpayment made to it, or such damages as the **City** may sustain by reason of the **Contractor's** failure to perform each and every part of its **Contract**.

CHAPTER VIII: LABOR PROVISIONS

ARTICLE 35. EMPLOYEES

35.1 The **Contractor** and its **Subcontractors** shall not employ on the **Work**:

35.1.1 Anyone who is not competent, faithful and skilled in the **Work** for which he/she shall be employed; and whenever the **Commissioner** shall inform the **Contractor**, in writing, that any employee is, in his/her opinion, incompetent, unfaithful or disobedient, that employee shall be discharged from the **Work** forthwith, and shall not again be employed upon it; or

35.1.2 Any labor, materials or means whose employment, or utilization during the course of this **Contract**, may tend to or in any way cause or result in strikes, work stoppages, delays, suspension of **Work** or similar troubles by workers employed by the **Contractor** or its **Subcontractors**, or by any of the trades working in or about the buildings and premises where **Work** is being performed under this **Contract**, or by **Other Contractors** or their **Subcontractors** pursuant to other contracts, or on any other building or premises owned or operated by the **City**, its **Agencies**, departments, boards or authorities. Any violation by the **Contractor** of this requirement may, upon certification of the **Commissioner**, be considered as proper and sufficient cause for declaring the **Contractor** to be in default, and for the **City** to take action against it as set forth in Chapter X of this **Contract**, or such other article of this **Contract** as the Commissioner may deem proper; or

35.1.3 In accordance with Section 220.3-e of the Labor Law of the State of New York (hereinafter "Labor Law"), the **Contractor** and its **Subcontractors** shall not employ on the **Work** any apprentice, unless he/she is a registered individual, under a bona fide program registered with the New York State Department of Labor. The allowable ratio of apprentices to journey-level workers in any craft classification shall not be greater than the ratio permitted to the **Contractor** as to its work force on any job under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the wage rate determined by the **Comptroller** of the **City** for the classification of **Work** actually performed. The **Contractor** or **Subcontractor** will be required to furnish written evidence of the registration of its program and apprentices as well as all the appropriate ratios and wage rates, for the area of the construction prior to using any apprentices on the **Contract Work**.

35.2 If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, all laborers, workers, and mechanics employed in the performance of the **Contract** on the public work site, either by the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by the **Contract**, shall be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

35.3 In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the Administrative Code, respectively,

35.3.1 The **Contractor** shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this **Contract** to (a) the Commissioner of the Department of Investigation, (b) a member of the New York City Council, the Public Advocate, or the **Comptroller**, or (c) the **CCPO**, **ACCO**, **Agency** head, or **Commissioner**.

35.3.2 If any of the **Contractor**'s officers or employees believes that he or she has been the subject of an adverse personnel action in violation of Article 35.3.1, he or she shall be entitled to bring a cause of action against the **Contractor** to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (a) an injunction to restrain continued retaliation, (b) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (c) reinstatement of full fringe benefits and seniority rights, (d) payment of two times back

pay, plus interest, and (e) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

35.3.3 The **Contractor** shall post a notice provided by the **City** in a prominent and accessible place on any site where work pursuant to the **Contract** is performed that contains information about:

35.3.3(a) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising out of or in connection with the **Contract**; and

35.3.3(b) the rights and remedies afforded to its employees under Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection with the reporting of allegations of fraud, false claims, criminality or corruption in connection with the **Contract**.

35.3.4 For the purposes of this Article 35.3, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation, any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

35.3.5 This Article 35.3 is applicable to all of the **Contractor**'s **Subcontractors** having subcontracts with a value in excess of $100,000; accordingly, the **Contractor** shall include this rider in all subcontracts with a value a value in excess of $100,000.

35.4 Article 35.3 is not applicable to this **Contract** if it is valued at $100,000 or less. Articles 35.3.1, 35.3.2, 35.3.4, and 35.3.5 are not applicable to this **Contract** if it was solicited pursuant to a finding of an emergency.

35.5 Paid Sick Leave Law.

35.5.1 Introduction and General Provisions.

35.5.1(a) The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time.[2] Contractors of the **City** or of other governmental entities may be required to provide sick time pursuant to the PSLL.

35.5.1(b) The PSLL became effective on April 1, 2014, and is codified at Title 20, Chapter 8, of the New York City Administrative Code. It is administered by the City's Department of Consumer Affairs ("DCA"); DCA's rules promulgated under the PSLL are codified at Chapter 7 of Title 6 of the Rules of the City of New York ("Rules").

[2] Pursuant to the PSLL, if fewer than five employees work for the same employer, as determined pursuant to New York City Administrative Code § 20-912(g), such employer has the option of providing such employees uncompensated sick time.

35.5.1(c) The **Contractor** agrees to comply in all respects with the PSLL and the Rules, and as amended, if applicable, in the performance of this **Contract**. The **Contractor** further acknowledges that such compliance is a material term of this **Contract** and that failure to comply with the PSLL in performance of this **Contract** may result in its termination.

35.5.1(d) The **Contractor** must notify the **Agency Chief Contracting Officer** of the **Agency** with whom it is contracting in writing within ten (10) days of receipt of a complaint (whether oral or written) regarding the PSLL involving the performance of this **Contract**. Additionally, the **Contractor** must cooperate with DCA's education efforts and must comply with DCA's subpoenas and other document demands as set forth in the PSLL and Rules.

35.5.1(e) The PSLL is summarized below for the convenience of the **Contractor**. The **Contractor** is advised to review the PSLL and Rules in their entirety. On the website www.nyc.gov/PaidSickLeave there are links to the PSLL and the associated Rules as well as additional resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the **Contractor** can get more information about how to comply with the PSLL. The **Contractor** acknowledges that it is responsible for compliance with the PSLL notwithstanding any inconsistent language contained herein.

35.5.2 Pursuant to the PSLL and the Rules: Applicability, Accrual, and Use.

35.5.2(a) An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of sick time for every 30 hours worked by an employee and compensation for such sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than 40 hours of sick time to an employee in any Year.

35.5.2(b) An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per **Day**. In addition, an employee may carry over up to 40 hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first **Day** of such Year.

35.5.2(c) An employee entitled to sick time pursuant to the PSLL may use sick time for any of the following:

i. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
ii. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental

illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

iii. closure of such employee's place of business by order of a public official due to a public health emergency; or

iv. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency.

35.5.2(d) An employer must not require an employee, as a condition of taking sick time, to search for a replacement. However, an employer may require an employee to provide: reasonable notice of the need to use sick time; reasonable documentation that the use of sick time was needed for a reason above if for an absence of more than three consecutive work days; and/or written confirmation that an employee used sick time pursuant to the PSLL. However, an employer may not require documentation specifying the nature of a medical condition or otherwise require disclosure of the details of a medical condition as a condition of providing sick time and health information obtained solely due to an employee's use of sick time pursuant to the PSLL must be treated by the employer as confidential.

35.5.2(e) If an employer chooses to impose any permissible discretionary requirement as a condition of using sick time, it must provide to all employees a written policy containing those requirements, using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny sick time to an employee because of non-compliance with such a policy.

35.5.2(f) Sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the sick time was used.

35.5.3 Exemptions and Exceptions. Notwithstanding the above, the PSLL does not apply to any of the following:

35.5.3(a) an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;

35.5.3(b) an employee covered by a valid collective bargaining agreement in effect on April 1, 2014, until the termination of such agreement;

35.5.3(c) an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;

35.5.3(d) an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;

35.5.3(e) an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;

35.5.3(f) an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

35.5.3(g) an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

35.5.3(h) a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

35.5.4 Retaliation Prohibited. An employer may not threaten or engage in retaliation against an employee for exercising or attempting in good faith to exercise any right provided by the PSLL. In addition, an employer may not interfere with any investigation, proceeding, or hearing pursuant to the PSLL.

35.5.5 Notice of Rights.

35.5.5(a) An employer must provide its employees with written notice of their rights pursuant to the PSLL. Such notice must be in English and the primary language spoken by an employee, provided that DCA has made available a translation into such language. Downloadable notices are available on DCA's website at http://www.nyc.gov/html/dca/html/law/PaidSickLeave.shtml.

35.5.5(b) Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed fifty dollars for each employee who was not given appropriate notice.

35.5.6 Records. An employer must retain records documenting its compliance with the PSLL for a period of at least three years, and must allow DCA to access such records in furtherance of an investigation related to an alleged violation of the PSLL.

35.5.7 Enforcement and Penalties.

35.5.7(a) Upon receiving a complaint alleging a violation of the PSLL, DCA has the right to investigate such complaint and attempt to resolve it through mediation. Within 30 **Days** of written notification of a complaint by DCA, or sooner in certain circumstances, the employer must provide DCA with a written response and such other information as DCA may request. If DCA believes that a violation of the PSLL has occurred, it has the right to issue a notice of violation to the employer.

35.5.7(b) DCA has the power to grant an employee or former employee all appropriate relief as set forth in New York City Administrative Code § 20-924(d). Such relief may include, among other remedies, treble damages for the wages that should have been paid, damages for unlawful retaliation, and damages and reinstatement for unlawful discharge. In addition, DCA may impose on an employer found to have violated the PSLL civil penalties not to exceed $500 for a first violation, $750 for a second violation within two years of the first violation, and $1,000 for each succeeding violation within two years of the previous violation.

35.5.8 More Generous Polices and Other Legal Requirements. Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract,

collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

35.6 HireNYC: Hiring and Reporting Requirements. This Article 35.6 applies to construction contracts of $1,000,000 or more. The **Contractor** shall comply with the requirements of Articles 35.6.1-35.6.5 for all non-trades jobs (e.g., for an administrative position arising out of **Work** ant located in New York City). The **Contractor** shall reasonably cooperate with SBS and the **City** on specific outreach events, including "Hire-on-the-Spot" events, for the hiring of trades workers in connection with the **Work**. If provided elsewhere in this **Contract**, this **Contract** is subject to a project labor agreement.

35.6.1 Enrollment. The **Contractor** shall enroll with the HireNYC system, found at www.nyc.gov/sbs, within thirty (30) days after the registration of this **Contract** pursuant to Section 328 of the New York City Charter. The **Contractor** shall provide information about the business, designate a primary contact and say whether it intends to hire for any entry to mid-level job opportunities arising from this **Contract** and located in New York City, and, if so, the approximate start date of the first hire.

35.6.2 Job Posting Requirements.

35.6.2(a) Once enrolled in HireNYC, the **Contractor** agrees to update the HireNYC portal with all entry to mid-level job opportunities arising from this **Contract** and located in New York City, if any, which shall be defined as jobs requiring no more than an associate degree, as provided by the New York State Department of Labor (see Column F of https://labor.ny.gov/stats/2012-2022- NYS-Employment-Prospects.xls). The information to be updated includes the types of entry and mid-level positions made available from the work arising from the **Contract** and located in New York City, the number of positions, the anticipated schedule of initiating the hiring process for these positions, and the contact information for the **Contractor's** representative charged with overseeing hiring. The **Contractor** must update the HireNYC portal with any hiring needs arising from the contract and located in New York City, and the requirements of the jobs to be filled, no less than three weeks prior to the intended first day of employment for each new position, except with the permission of SBS, not to be unreasonably withheld, and must also update the HireNYC portal as set forth below.

35.6.2(b) After enrollment through HireNYC and submission of relevant information, SBS will work with the **Contractor** to develop a recruitment plan which will outline the candidate screening process, and will provide clear instructions as to when, where, and how interviews will take place. HireNYC will screen applicants based on employer requirements and refer applicants whom it believes are qualified to the **Contractor** for interviews. The **Contractor** must interview referred applicants whom it believes are qualified.

35.6.2(c) After completing an interview of a candidate referred by HireNYC, the **Contractor** must provide feedback via the portal within twenty (20) business days to indicate which candidates were interviewed and hired, if any. In addition, the **Contractor** shall provide the start date of new hires, and additional information

reasonably related to such hires, within twenty (20) business days after the start date. In the event the **Contractor** does not have any job openings covered by this Rider in any given year, the **Contractor** shall be required to provide an annual update to HireNYC to that effect. For this purpose, the reporting year shall run from the date of the registration of the **Contract** pursuant to Charter section 328 and each anniversary date.

35.6.2(d) These requirements do not limit the **Contractor's** ability to assess the qualifications of prospective workers, and to make final hiring and retention decisions. No provision of this Article 35.6 shall be interpreted so as to require the **Contractor** to employ any particular worker.

35.6.2(e) In addition, the provisions of this Article 35.6 shall not apply to positions that the **Contractor** intends to fill with employees employed pursuant to the job retention provision of Section 22-505 of the Administrative Code of the City of New York. The **Contractor** shall not be required to report such openings with HireNYC. However, the **Contractor** shall enroll with the HireNYC system pursuant to Article 35.6.1, above, and, if such positions subsequently become open, then the remaining provisions of this Article 35.6 will apply.

35.6.3 Breach and Liquidated Damages. If the **Contractor** fails to comply with the terms of the **ContrSact** and this Article 35.6 (l) by not enrolling its business with HireNYC; (2) by not informing HireNYC, as required, of open positions; or (3) by failing to interview a qualified candidate, the **Agency** may assess liquidated damages in the amount of two-thousand five hundred dollars ($2,500) per breach. For all other events of noncompliance with the terms of this Article 35.6, the **Agency** may assess liquidated damages in the amount of five hundred dollars ($500) per breach. Furthermore, in the event the **Contractor** breaches the requirements of this Article 35.6 during the term of the **Contract**, the **City** may hold the **Contractor** in default of this **Contract**.

35.6.4 Audit Compliance. In addition to the auditing requirements set forth in other parts of the **Contract**, the **Contractor** shall permit SBS and the **City** to inspect any and all records concerning or relating to job openings or the hiring of individuals for work arising from the **Contract** and located in New York City. The **Contractor** shall permit an inspection within seven (7) business days of the request.

35.6.5 Other Reporting Requirements. The **Contractor** shall report to the **City**, on a monthly basis, all information reasonably requested by the **City** that is necessary for the **City** to comply with any reporting requirements imposed by **Law**, including any requirement that the **City** maintain a publicly accessible database. In addition, the **Contractor** agrees to comply with all reporting requirements imposed by **Law**, or as otherwise requested by the **City**.

35.6.6 Federal Hiring Requirements. If this **Contract** is federally funded (as indicated elsewhere in this Contract), the **Contractor** shall comply with all federal hiring requirements as may be set forth in this **Contract**, including, as applicable: (a) Section 3 of the HUD Act of 1968, which requires, to the greatest extent feasible, economic opportunities for 30 percent of new hires be given to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing and Executive Order 11246, which prohibits discrimination in employment due to race, color, religion, sex or national origin, and requires the implementation of goals for minority and female participation for work involving any construction trade.

ARTICLE 36. NO DISCRIMINATION

36.1 The **Contractor** specifically agrees, as required by Labor Law Section 220-e, as amended, that:

36.1.1 In the hiring of employees for the performance of **Work** under this **Contract** or any subcontract hereunder, neither the **Contractor**, **Subcontractor**, nor any person acting on behalf of such **Contractor** or **Subcontractor**, shall by reason of race, creed, color or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the **Work** to which the employment relates;

36.1.2 Neither the **Contractor**, **Subcontractor**, nor any person on its behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of **Work** under this **Contract** on account of race, creed, color or national origin;

36.1.3 There may be deducted from the amount payable to the **Contractor** by the **City** under this **Contract** a penalty of fifty ($50.00) dollars for each person for each **Day** during which such person was discriminated against or intimidated in violation of the provisions of this **Contract**; and

36.1.4 This **Contract** may be cancelled or terminated by the **City** and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this Article 36.

36.1.5 This Article 36 covers all construction, alteration and repair of any public building or public work occurring in the State of New York and the manufacture, sale, and distribution of materials, equipment, and supplies to the extent that such operations are performed within the State of New York pursuant to this **Contract**.

36.2 The **Contractor** specifically agrees, as required by Section 6-108 of the Administrative Code, as amended, that:

36.2.1 It shall be unlawful for any person engaged in the construction, alteration or repair of buildings or engaged in the construction or repair of streets or highways pursuant to a **Contract** with the **City** or engaged in the manufacture, sale or distribution of materials, equipment or supplies pursuant to a **Contract** with the **City** to refuse to employ or to refuse to continue in any employment any person on account of the race, color or creed of such person.

36.2.2 It shall be unlawful for any person or any servant, agent or employee of any person, described in Article 36.1.2, to ask, indicate or transmit, orally or in writing, directly or indirectly, the race, color or creed or religious affiliation of any person employed or seeking employment from such person, firm or corporation.

36.2.3 Breach of the foregoing provisions shall be deemed a violation of a material provision of this **Contract**.

36.2.4 Any person, or the employee, manager or owner of or officer of such firm or corporation who shall violate any of the provisions of this Article 36.2 shall, upon

conviction thereof, be punished by a fine of not more than one hundred ($100.00) dollars or by imprisonment for not more than thirty (30) **Days**, or both.

36.3 This **Contract** is subject to the requirements of Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules and regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this **Contract**, the **Contractor** agrees that it:

36.3.1 Will not engage in any unlawful discrimination against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, marital status or sexual orientation with respect to all employment decisions including, but not limited to, recruitment, hiring, upgrading, demotion, downgrading, transfer, training, rates of pay or other forms of compensation, layoff, termination, and all other terms and conditions of employment; and

36.3.2 Will not engage in any unlawful discrimination in the selection of **Subcontractors** on the basis of the owner's race, color, creed, national origin, sex, age, disability, marital status or sexual orientation; and

36.3.3 Will state in all solicitations or advertisements for employees placed by or on behalf of the **Contractor** that all qualified applicants will receive consideration for employment without unlawful discrimination based on race, creed, color, national origin, sex, age, citizens status, disability, marital status, sexual orientation, or that it is an equal employment opportunity employer; and

36.3.4 Will send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or memorandum of understanding, written notification of its equal employment opportunity commitments under E.O. 50 and the rules and regulations promulgated thereunder; and

36.3.5 Will furnish, before the award of the **Contract**, all information and reports, including an employment report, that are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the **City** Department of Business Services, Division of Labor Services (**DLS**) and will permit access to its books, records, and accounts by the **DLS** for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.4 The **Contractor** understands that in the event of its noncompliance with the nondiscrimination clauses of this **Contract** or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this **Contract** and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the **DLS**, the Director of the **DLS** may direct the **Commissioner** to impose any or all of the following sanctions:

36.4.1 Disapproval of the **Contractor**; and/or

36.4.2 Suspension or termination of the **Contract**; and/or

36.4.3 Declaring the **Contractor** in default; and/or

36.4.4 In lieu of any of the foregoing sanctions, the Director of the **DLS** may impose an employment program.

In addition to any actions taken under this **Contract**, failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in a **City Agency** declaring the **Contractor** to be non-responsible in future procurements. The **Contractor** further agrees that it will refrain from entering into any **Contract** or **Contract** modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a **Subcontractor** who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

36.5 The **Contractor** specifically agrees, as required by Section 6-123 of the Administrative Code, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title 8 of the Administrative Code; and

36.5.2 Any failure to comply with this Article 36.5 may subject the **Contractor** to the remedies set forth in Section 6-123 of the Administrative Code, including, where appropriate, sanctions such as withholding of payment, imposition of an employment program, finding the **Contractor** to be in default, cancellation of the **Contract**, or any other sanction or remedy provided by **Law** or **Contract**.

ARTICLE 37. LABOR LAW REQUIREMENTS

37.1 The **Contractor** shall strictly comply with all applicable provisions of the Labor Law, as amended. Such compliance is a material term of this **Contract**.

37.2 The **Contractor** specifically agrees, as required by Labor Law Sections 220 and 220-d, as amended, that:

37.2.1 Hours of **Work**: No laborer, worker, or mechanic in the employ of the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by this **Contract** shall be permitted or required to work more than eight (8) hours in any one (1) **Day**, or more than five (5) **Days** in any one (1) week, except as provided in the Labor Law and in cases of extraordinary emergency including fire, flood, or danger to life or property, or in the case of national emergency when so proclaimed by the President of the United States of America.

37.2.2 In situations in which there are not sufficient laborers, workers, and mechanics who may be employed to carry on expeditiously the **Work** contemplated by this **Contract** as a result of such restrictions upon the number of hours and **Days** of labor, and the immediate commencement or prosecution or completion without undue delay of the **Work** is necessary for the preservation of the **Site** and/or for the protection of the life and limb of the persons using the same, such laborers, workers, and mechanics shall be permitted or required to work more than eight (8) hours in any one (1) **Day**; or five (5) **Days** in any one (1) week; provided, however, that upon application of any **Contractor**, the **Commissioner** shall have first certified to the Commissioner of Labor of the State of New York (hereinafter "Commissioner of Labor") that such public **Work** is of an important nature and that a delay in carrying it to completion would result in serious disadvantage to the public; and provided, further, that such Commissioner of Labor shall have determined that such an emergency does in fact exist as provided in Labor Law Section 220.2.

37.2.3 Failure of the **Commissioner** to make such a certification to the Commissioner of Labor shall not entitle the **Contractor** to damages for delay or for any cause whatsoever.

37.2.4 Prevailing Rate of Wages: The wages to be paid for a legal day's **Work** to laborers, workers, or mechanics employed upon the **Work** contemplated by this **Contract** or upon any materials to be used thereon shall not be less than the "prevailing rate of wage" as defined in Labor Law Section 220, and as fixed by the **Comptroller** in the attached Schedule of Wage Rates and in updated schedules thereof. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the **Work** is being performed.

37.2.5 Requests for interpretation or correction in the Information for Bidders includes all requests for clarification of the classification of trades to be employed in the performance of the **Work** under this **Contract**. In the event that a trade not listed in the **Contract** is in fact employed during the performance of this **Contract**, the **Contractor** shall be required to obtain from the **Agency** the prevailing wage rates and supplementary benefits for the trades used and to complete the performance of this **Contract** at the price at which the **Contract** was awarded.

37.2.6 Minimum Wages: Except for employees whose wage is required to be fixed pursuant to Labor Law Section 220, all persons employed by the **Contractor** and any **Subcontractor** in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor, or services, used in the performance of this **Contract**, shall be paid, without subsequent deduction or rebate unless expressly authorized by **Law**, not less than the sum mandated by **Law**.

37.3 Working Conditions: No part of the **Work**, labor or services shall be performed or rendered by the **Contractor** in any plants, factories, buildings or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of this **Contract**. Compliance with the safety, sanitary, and factory inspection **Laws** of the state in which the **Work** is to be performed shall be prima facie evidence of compliance with this Article 37.3.

37.4 Prevailing Wage Enforcement: The **Contractor** agrees to pay for all costs incurred by the **City** in enforcing prevailing wage requirements, including the cost of any investigation conducted by or on behalf of the **Agency** or the **Comptroller,** where the **City** discovers a failure to comply with any of the requirements of this Article 37 by the **Contractor** or its **Subcontractor(s)**. The **Contractor** also agrees that, should it fail or refuse to pay for any such investigation, the **Agency** is hereby authorized to deduct from a **Contractor's** account an amount equal to the cost of such investigation.

37.4.1 The Labor Law Section 220 and Section 220-d, as amended, provide that this **Contract** shall be forfeited and no sum paid for any **Work** done hereunder on a second conviction for willfully paying less than:

37.4.1(a) The stipulated prevailing wage scale as provided in Labor Law section 220, as amended, or

37.4.1(b) The stipulated minimum hourly wage scale as provided in Labor Law section 220-d, as amended.

37.4.2 For any breach or violation of either working conditions (Article 37.3) or minimum wages (Article 37.2.6) provisions, the party responsible therefor shall be liable to the **City** for liquidated damages, which may be withheld from any amounts due on any contracts with the **City** of such party responsible, or may be recovered in actions brought by the **City**

Corporation Counsel in the name of the **City**, in addition to damages for any other breach of this **Contract**, for a sum equal to the amount of any underpayment of wages due to any employee engaged in the performance of this **Contract**. In addition, the **Commissioner** shall have the right to cancel contracts and enter into other contracts for the completion of the original contract, with or without public letting, and the original **Contractor** shall be liable for any additional cost. All sums withheld or recovered as deductions, rebates, refunds, or underpayment of wages hereunder, shall be held in a special deposit account and shall be paid without interest, on order of the **Comptroller**, directly to the employees who have been paid less than minimum rates of pay as set forth herein and on whose account such sums were withheld or recovered, provided that no claims by employees for such payments shall be entertained unless made within two (2) years from the date of actual notice to the **Contractor** of the withholding or recovery of such sums by the **City**.

37.4.3 A determination by the **Comptroller** that a **Contractor** and/or its **Subcontractor** willfully violated Labor Law Section 220 will be forwarded to the **City's** five District Attorneys for review.

37.4.4 The **Contractor's** or **Subcontractor's** noncompliance with this Article 37.4 and Labor Law Section 220 may result in an unsatisfactory performance evaluation and the **Comptroller** may also find and determine that the **Contractor** or **Subcontractor** willfully violated the New York Labor **Law**.

37.4.4(a) An unsatisfactory performance evaluation for noncompliance with this Article 37.4 may result in a determination that the **Contractor** is a non-responsible bidder on subsequent procurements with the **City** and thus a rejection of a future award of a contract with the **City**, as well as any other sanctions provided for by **Law**.

37.4.4(b) Labor Law Section 220-b, as amended, provides that when two (2) final determinations have been rendered against a **Contractor** or **Subcontractor** within any consecutive six (6) year period determining that such **Contractor** or **Subcontractor** has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with the Labor Law and this Article 37.4, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public works projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the second final determination. If the final determination involves the falsification of payroll records or the kickback of wages or supplements, the **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the first final determination.

37.4.4(c) Labor Law Section 220, as amended, provides that the **Contractor** or **Subcontractor** found to have violated this Article 37.4 may be directed to make payment of wages or supplements including interest found to be due, and the **Contractor** or **Subcontractor** may be directed to make payment of a further sum as a civil penalty in an amount not exceeding twenty-five (25%) percent of the total amount found to be due.

37.5 The **Contractor** and its **Subcontractors** shall within ten (10) **Days** after mailing of a Notice of Award or written order, post in prominent and conspicuous places in each and every plant, factory, building, and structure where employees of the **Contractor** and its **Subcontractors** engaged in the

performance of this **Contract** are employed, notices furnished by the **City**, in relation to prevailing wages and supplements, minimum wages, and other stipulations contained in Sections 220 and 220-h of the Labor Law, and the **Contractor** and its **Subcontractors** shall continue to keep such notices posted in such prominent and conspicuous places until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services required to be furnished or rendered under this **Contract**.

37.6 The **Contractor** shall strictly comply with all of the provisions of Articles 37.6.1 through 37.6.5, and provide for all workers, laborers or mechanics in its employ, the following:

37.6.1 Notices Posted At **Site**: Post, in a location designated by the **City**, schedules of prevailing wages and supplements for this **Project**, a copy of all re-determinations of such schedules for the **Project**, the Workers' Compensation **Law** Section 51 notice, all other notices required by **Law** to be posted at the **Site**, the **City** notice that this **Project** is a public works project on which each worker is entitled to receive the prevailing wages and supplements for the occupation at which he or she is working, and all other notices which the **City** directs the **Contractor** to post. The **Contractor** shall provide a surface for such notices which is satisfactory to the **City**. The **Contractor** shall maintain and keep current such notices in a legible manner and shall replace any notice or schedule which is damaged, defaced, illegible or removed for any reason. The **Contractor** shall post such notices before commencing any **Work** on the **Site** and shall maintain such notices until all **Work** on the **Site** is complete; and

37.6.2 Daily **Site** Sign-in Sheets: Maintain daily **Site** sign-in sheets, and require that **Subcontractors** maintain daily **Site** sign-in sheets for its employees, which include blank spaces for an employee's name to be both printed and signed, job title, date started and Social Security number, the time the employee began work and the time the employee left work, until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services to be furnished or rendered under this **Contract** unless exception is granted by the **Comptroller** upon application by the **Agency**. In the alternative, subject to the approval of the **CCPO**, the **Contractor** and **Subcontractor** may maintain an electronic or biometric sign-in system, which provides the information required by this Article 37.6.2; and

37.6.3 Individual Employee Information Notices: Distribute a notice to each worker, laborer or mechanic employed under this **Contract**, in a form provided by the **Agency**, that this **Project** is a public works project on which each worker, laborer or mechanic is entitled to receive the prevailing rate of wages and supplements for the occupation at which he or she is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, such notice shall also include a statement that each worker, laborer or mechanic must be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration. Such notice shall be distributed to each worker before he or she starts performing any **Work** of this **Contract** and with the first paycheck after July first of each year. "Worker, laborer or mechanic" includes employees of the **Contractor** and all **Subcontractors** and all employees of suppliers entering the **Site**. At the time of distribution, the **Contractor** shall have each worker, laborer or mechanic sign a statement, in a form provided by the **Agency**, certifying that the worker has received the notice required by this Article 37.6.3, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3(a) The **Contractor** and each **Subcontractor** shall notify each worker, laborer or mechanic employed under this **Contract** in writing of the prevailing rate of

wages for their particular job classification. Such notification shall be given to every worker, laborer, and mechanic on their first pay stub and with every pay stub thereafter; and

37.6.4 **Site** Laminated Identification Badges: The **Contractor** shall provide laminated identification badges which include a photograph of the worker's, laborer's or mechanic's face and indicate the worker's, laborer's or mechanic's name, trade, employer's name, and employment starting date (month/day/year). Further, the **Contractor** shall require as a condition of employment on the **Site**, that each and every worker, laborer or mechanic wear the laminated identification badge at all times and that it may be seen by any representative of the **City**. The **Commissioner** may grant a written waiver from the requirement that the laminated identification badge include a photograph if the **Contractor** demonstrates that the identity of an individual wearing a laminated identification badge can be easily verified by another method; and

37.6.5 Language Other Than English Used On **Site**: Provide the **ACCO** notice when three (3) or more employees (worker and/or laborer and/or mechanic) on the **Site**, at any time, speak a language other than English. The **ACCO** will then provide the **Contractor** the notices described in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under this Article 37; and

37.6.6 Provision of Records: The **Contractor** and **Subcontractor(s)** shall produce within five (5) **Days** on the **Site** of the **Work** and upon a written order of the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, or the **Comptroller,** such records as are required to be kept by this Article 37.6; and

37.6.7 The **Contractor** and **Subcontractor(s)** shall pay employees by check or direct deposit. If this **Contract** is for an amount greater than one million ($1,000,000) dollars, checks issued by the **Contractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**). For any subcontract for an amount greater than seven hundred fifty thousand ($750,000) dollars, checks issued by a **Subcontractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**); and

37.6.8 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 37.6.1 through 37.6.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

37.7 The **Contractor** and its **Subcontractors** shall keep such employment and payroll records as are required by Section 220 of the Labor Law. The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of this Article 37.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract.**

37.8 At the time the **Contractor** makes application for each partial payment and for final payment, the **Contractor** shall submit to the **Commissioner** a written payroll certification, in the form provided by this **Contract**, of compliance with the prevailing wage, minimum wage, and other provisions and stipulations required by Labor Law Section 220 and of compliance with the training requirements of Labor Law Section 220-h set forth in Article 35.2. This certification of compliance shall be a condition precedent to payment and no payment shall be made to the **Contractor** unless and until each such certification shall have been submitted to and received by the **Commissioner**.

37.9 This **Contract** is executed by the **Contractor** with the express warranty and representation that the **Contractor** is not disqualified under the provisions of Section 220 of the Labor Law from the award of the **Contract**.

37.10 Any breach or violation of any of the foregoing shall be deemed a breach or violation of a material provision of this **Contract**, and grounds for cancellation thereof by the **City**.

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain on the **Site** during the performance of the **Work** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii). The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts along with each and every payment requisition. If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both along with its payment requisitions and independently of its payment requisitions.

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

38.4 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 38.1 and/or 38.2 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

ARTICLE 39. DUST HAZARDS

39.1 Should a harmful dust hazard be created in performing the **Work** of this **Contract**, for the elimination of which appliances or methods have been approved by the Board of Standards and Appeals

of the City of New York, such appliances and methods shall be installed, maintained, and effectively operated during the continuance of such harmful dust hazard. Failure to comply with this provision after notice shall make this **Contract** voidable at the sole discretion of the **City**.

CHAPTER IX: PARTIAL AND FINAL PAYMENTS

ARTICLE 40. CONTRACT PRICE

40.1 The **City** shall pay, and the **Contractor** agrees to accept, in full consideration for the **Contractor's** performance of the **Work** subject to the terms and conditions hereof, the lump sum price or unit prices for which this **Contract** was awarded, plus the amount required to be paid for any **Extra Work** ordered by the **Commissioner** under Article 25, less credit for any **Work** omitted pursuant to Article 29.

ARTICLE 41. BID BREAKDOWN ON LUMP SUM

41.1 Within fifteen (15) **Days** after the commencement date specified in the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall submit to the **Resident Engineer** a breakdown of its bid price, or of lump sums bid for items of the **Contract**, showing the various operations to be performed under the **Contract**, as directed in the progress schedule required under Article 9, and the value of each of such operations, the total of such items to equal the lump sum price bid. Said breakdown must be approved in writing by the **Resident Engineer**.

41.2 No partial payment will be approved until the **Contractor** submits a bid breakdown that is acceptable to the **Resident Engineer**.

41.3 The **Contractor** shall also submit such other information relating to the bid breakdown as directed by the **Resident Engineer**. Thereafter, the breakdown may be used only for checking the **Contractor's** applications for partial payments hereunder, but shall not be binding upon the **City**, the **Commissioner**, or the **Engineer** for any purpose whatsoever.

ARTICLE 42. PARTIAL PAYMENTS

42.1 From time to time as the **Work** progresses satisfactorily, but not more often than once each calendar month (except where the **Commissioner** approves in writing the submission of invoices on a more frequent basis and for invoices relating to **Work** performed pursuant to a change order), the **Contractor** may submit to the **Engineer** a requisition for a partial payment in the prescribed form, which shall contain an estimate of the quantity and the fair value of the **Work** done during the payment period.

42.2 Partial payments may be made for materials, fixtures, and equipment in advance of their actual incorporation in the **Work**, as the **Commissioner** may approve, and upon the terms and conditions set forth in the General Conditions.

42.3 The **Contractor** shall also submit to the **Commissioner** in connection with every application for partial payment a verified statement in the form prescribed by the **Comptroller** setting forth the information required under Labor Law Section 220-a.

42.4 Within thirty (30) **Days** after receipt of a satisfactory payment application, and within sixty (60) **Days** after receipt of a satisfactory payment application in relation to **Work** performed pursuant to a change order, the **Engineer** will prepare and certify, and the **Commissioner** will approve, a voucher for a partial payment in the amount of such approved estimate, less any and all deductions authorized to be made by the **Commissioner** under the terms of this **Contract** or by **Law**.

ARTICLE 43. PROMPT PAYMENT

43.1 The Prompt Payment provisions of the **PPB** Rules in effect at the time of the bid will be applicable to payments made under this **Contract**. The provisions require the payment to the **Contractor** of interest on payments made after the required payment date, except as set forth in the **PPB** Rules.

43.2 The **Contractor** shall submit a proper invoice to receive payment, except where the **Contract** provides that the **Contractor** will be paid at predetermined intervals without having to submit an invoice for each scheduled payment.

43.3 Determination of interest due will be made in accordance with the **PPB** Rules.

43.4 If the **Contractor** is paid interest, the proportionate share(s) of that interest shall be forwarded by the **Contractor** to its **Subcontractor(s)**.

43.5 The **Contractor** shall pay each **Subcontractor** or **Materialman** not later than seven (7) **Days** after receipt of payment out of amounts paid to the **Contractor** by the **City** for **Work** performed by the **Subcontractor** or **Materialman** under this **Contract**.

> 43.5.1 If **Contractor** fails to make any payment to any **Subcontractor** or **Materialman** within seven (7) **Days** after receipt of payment by the **City** pursuant to this Article 43.5, then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at the rate of interest in effect on the date such payment is made by the **Contractor** computed in accordance with Section 756-b (1)(b) of the New York General Business Law. Accrual of interest shall commence on the **Day** immediately following the expiration of the seventh **Day** following receipt of payment by the **Contractor** from the **City** and shall end on the date on which payment is made.

43.6 The **Contractor** shall include in each of its subcontracts a provision requiring each **Subcontractor** to make payment to each of its **Subcontractors** or **Materialmen** for **Work** performed under this **Contract** in the same manner and within the same time period set forth above.

ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT

44.1 The **Contractor** shall submit with the **Substantial Completion** requisition:

> 44.1.1 A final verified statement of any pending Article 27 disputes in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the

Contractor claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay.

44.1.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 44.1.1(a) is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor** upon acceptance of the **Substantial Completion** payment pursuant to this Article 44, will have waived any such claims.

44.1.2 A **Final Approved Punch List**.

44.1.3 Where required, a request for an extension of time to achieve **Substantial Completion** or final extension of time.

44.2 The **Commissioner** shall issue a voucher calling for payment of any part or all of the balance due for **Work** performed under the **Contract**, including monies retained under Article 21, less any and all deductions authorized to be made by the **Commissioner**, under this **Contract** or by **Law**, and less twice the amount the **Commissioner** considers necessary to ensure the completion of the balance of the **Work** by the **Contractor**. Such a payment shall be considered a partial and not a final payment. No **Substantial Completion** payment shall be made under this Article 44 where the **Contractor** failed to complete the **Work** within the time fixed for such completion in the Schedule A of the General Conditions, or within the time to which completion may have been extended, until an extension or extensions of time for the completion of **Work** have been acted upon pursuant to Article 13.

44.3 No further partial payments shall be made to the **Contractor** after **Substantial Completion**, except the **Substantial Completion** payment and payment pursuant to any **Contractor's** requisition that were properly filed with the **Commissioner** prior to the date of **Substantial Completion**; however, the **Commissioner** may grant a waiver for further partial payments after the date of **Substantial Completion** to permit payments for change order **Work** and/or release of retainage and deposits pursuant to Articles 21 and 24. Such waiver shall be in writing.

44.4 The **Contractor** acknowledges that nothing contained in this Article 44 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 45. FINAL PAYMENT

45.1 After completion and **Final Acceptance** of the **Work**, the **Contractor** shall submit all required certificates and documents, together with a requisition for the balance claimed to be due under the **Contract**, less the amount authorized to be retained for maintenance under Article 24. Such submission shall be within 90 days of the date of the **Commissioner's** written determination of **Final Acceptance**, or within such additional time as may be granted by the **Commissioner** in writing. If the **Contractor** fails to submit all required certificates and documents within the time allowed, no payment of the balance claimed shall be made to the **Contractor** and the **Contractor** shall be deemed to have forfeited its right to payment of any balance claimed. A verified statement similar to that required in connection with applications for partial payments shall also be submitted to the **Commissioner**.

45.2 Amended Verified Statement of Claims: The **Contractor** shall also submit with the final requisition any amendments to the final verified statement of any pending dispute resolution procedures in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) that have occurred subsequent to **Substantial Completion**, setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each such item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay. With reference to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 45.2, is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor**, upon acceptance of the Final Payment pursuant to Article 46, will have waived any such claims.

45.3 Preparation of Final Voucher: Upon determining the balance due hereunder other than on account of claims, the **Engineer** will prepare and certify, for the Commissioner's approval, a voucher for final payment in that amount less any and all deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**. In the case of a lump sum **Contract**, the **Commissioner** shall certify the voucher for final payment within thirty (30) **Days** from the date of completion and acceptance of the **Work**, provided all requests for extensions of time have been acted upon.

45.3.1 All prior certificates and vouchers upon which partial payments were made, being merely estimates made to enable the **Contractor** to prosecute the **Work** more advantageously, shall be subject to correction in the final voucher, and the certification of the **Engineer** thereon and the approval of the **Commissioner** thereof, shall be conditions precedent to the right of the **Contractor** to receive any money hereunder. Such final voucher shall be binding and conclusive upon the **Contractor**.

45.3.2 Payment pursuant to such final voucher, less any deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**, shall constitute the final payment, and shall be made by the **Comptroller** within thirty (30) **Days** after the filing of such voucher in his/her office.

45.4 The **Contractor** acknowledges that nothing contained in this Article 45 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT

46.1 The acceptance by the **Contractor**, or by anyone claiming by or through it, of the final payment, whether such payment be made pursuant to any judgment of any court, or otherwise, shall constitute and operate as a release of the **City** from any and all claims of and liability to the **Contractor** for anything heretofore done or furnished for the **Contractor** relating to or arising out of this **Contract** and the **Work** done hereunder, and for any prior act, neglect or default on the part of the **City** or any of its officials, agents or employees, excepting only a claim against the **City** for the amounts deducted or retained in accordance with the terms and provisions of this **Contract** or by **Law**, and excepting any claims, not otherwise waived, or any pending dispute resolution procedures which are contained in the

verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45.

46.2 The **Contractor** is warned that the execution by it of a release, in connection with the acceptance of the final payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Article 46, or those for amounts deducted by the **Commissioner** from the final requisition or from the final payment as certified by the **Engineer** and approved by the **Commissioner**, shall not be effective to reserve such claims, anything stated to the **Contractor** orally or in writing by any official, agent or employee of the **City** to the contrary notwithstanding.

46.3 Should the **Contractor** refuse to accept the final payment as tendered by the **Comptroller**, it shall constitute a waiver of any right to interest thereon.

46.4 The **Contractor**, however, shall not be barred by this Article 46 from commencing an action for breach of **Contract** to the extent permitted by **Law** and by the terms of the **Contract** for any claims that are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45 or that arose after submission of the final payment requisition, provided that a detailed and verified statement of claim is served upon the contracting **Agency** and **Comptroller** not later than forty (40) **Days** after the making of such final payment by electronic funds transfer (EFT) or the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION

47.1 All works of art, including paintings, mural decorations, stained glass, statues, bas-reliefs, and other sculptures, monuments, fountains, arches, and other structures of a permanent character intended for ornament or commemoration, and every design of the same to be used in the performance of this **Contract**, and the design of all bridges, approaches, buildings, gates, fences, lamps, or structures to be erected, pursuant to the terms of this **Contract**, shall be submitted to the Art Commission, d/b/a the Public Design Commission of the City of New York, and shall be approved by the Public Design Commission prior to the erection or placing in position of the same. The final payment shall not become due or payable under this **Contract** unless and until the Public Design Commission shall certify that the design for the **Work** herein contracted for has been approved by the said Public Design Commission, and that the same has been executed in substantial accordance with the design so approved, pursuant to the provisions of Chapter 37, Section 854 of the **City** Charter, as amended.

CHAPTER X: CONTRACTOR'S DEFAULT

ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT

48.1 In addition to those instances specifically referred to in other Articles herein, the **Commissioner** shall have the right to declare the **Contractor** in default of this **Contract** if:

48.1.1 The **Contractor** fails to commence **Work** when notified to do so by the **Commissioner**; or if

48.1.2 The **Contractor** shall abandon the **Work**; or if

48.1.3 The **Contractor** shall refuse to proceed with the **Work** when and as directed by the **Commissioner**; or if

48.1.4 The **Contractor** shall, without just cause, reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the **Commissioner**, to complete the **Work** in accordance with the progress schedule; or if

48.1.5 The **Contractor** shall fail or refuse to increase sufficiently such working force when ordered to do so by the **Commissioner**; or if

48.1.6 The **Contractor** shall sublet, assign, transfer, convert or otherwise dispose of this **Contract** other than as herein specified; or sell or assign a majority interest in the **Contractor**; or if

48.1.7 The **Contractor** fails to secure and maintain all required insurance; or if

48.1.8 A receiver or receivers are appointed to take charge of the **Contractor's** property or affairs; or if

48.1.9 The **Commissioner** shall be of the opinion that the **Contractor** is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the **Work**, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if

48.1.10 The **Commissioner** shall be of the opinion that the **Contractor** is or has been willfully or in bad faith violating any of the provisions of this **Contract**; or if

48.1.11 The **Commissioner** shall be of the opinion that the **Work** cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the **Commissioner's** opinion, attributable to conditions within the **Contractor's** control; or if

48.1.12 The **Work** is not completed within the time herein provided therefor or within the time to which the **Contractor** may be entitled to have such completion extended; or if

48.1.13 Any statement or representation of the **Contractor** in the **Contract** or in any document submitted by the **Contractor** with respect to the **Work**, the **Project**, or the **Contract** (or for purposes of securing the **Contract**) was untrue or incorrect when made; or if

48.1.14 The **Contractor** or any of its officers, directors, partners, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the **PPB** Rules.

48.2 Before the **Commissioner** shall exercise his/her right to declare the **Contractor** in default, the **Commissioner** shall give the **Contractor** an opportunity to be heard, upon not less than two (2) **Days**' notice.

ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT

49.1 The right to declare the **Contractor** in default for any of the grounds specified or referred to in Article 48 shall be exercised by sending the **Contractor** a notice, signed by the **Commissioner**, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

49.2 The **Commissioner's** determination that the **Contractor** is in default shall be conclusive, final, and binding on the parties and such a finding shall preclude the **Contractor** from commencing a plenary action for any damages relating to the **Contract**. If the **Contractor** protests the determination of the **Commissioner**, the **Contractor** may commence an action in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

ARTICLE 50. QUITTING THE SITE

50.1 Upon receipt of such notice the **Contractor** shall immediately discontinue all further operations under this **Contract** and shall immediately quit the **Site**, leaving untouched all plant, materials, equipment, tools, and supplies then on the **Site**.

ARTICLE 51. COMPLETION OF THE WORK

51.1 The **Commissioner**, after declaring the **Contractor** in default, may then have the **Work** completed by such means and in such manner, by contract with or without public letting, or otherwise, as he/she may deem advisable, utilizing for such purpose such of the **Contractor's** plant, materials, equipment, tools, and supplies remaining on the **Site**, and also such **Subcontractors**, as he/she may deem advisable.

51.2 After such completion, the **Commissioner** shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the **Contract**) from the date when the **Work** should have been completed by the **Contractor** in accordance with the terms hereof to the date of actual completion of the **Work**. Such certificate shall be binding and conclusive upon the **Contractor**, its sureties, and any person claiming under the **Contractor**, as to the amount thereof.

51.3 The expense of such completion, including any and all related and incidental costs, as so certified by the **Commissioner**, and any liquidated damages assessed against the **Contractor**, shall be charged against and deducted out of monies which are earned by the **Contractor** prior to the date of default. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

ARTICLE 52. PARTIAL DEFAULT

52.1 In case the **Commissioner** shall declare the **Contractor** in default as to a part of the **Work** only, the **Contractor** shall discontinue such part, shall continue performing the remainder of the **Work** in strict conformity with the terms of this **Contract**, and shall in no way hinder or interfere with any **Other Contractor(s)** or persons whom the **Commissioner** may engage to complete the **Work** as to which the **Contractor** was declared in default.

52.2 The provisions of this Chapter relating to declaring the **Contractor** in default as to the entire **Work** shall be equally applicable to a declaration of partial default, except that the **Commissioner** shall be entitled to utilize for completion of the part of the **Work** as to which the **Contractor** was declared in default only such plant, materials, equipment, tools, and supplies as had been previously used by the **Contractor** on such part.

ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK

53.1 In completing the whole or any part of the **Work** under the provisions of this Chapter X, the **Commissioner** shall have the power to depart from or change or vary the terms and provisions of this **Contract**, provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variation, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the **Commissioner's** certificate of the cost of completion referred to in Article 51, nor shall it constitute a defense to an action to recover the amount by which such certificate exceeds the amount which would have been payable to the **Contractor** hereunder but for its default.

ARTICLE 54. OTHER REMEDIES

54.1 In addition to the right to declare the **Contractor** in default pursuant to this Chapter X, the **Commissioner** shall have the absolute right, in his/her sole discretion and without a hearing, to complete or cause to be completed in the same manner as described in Articles 51 and 53, any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List**. A written notice of the exercise of this right shall be sent to the **Contractor** who shall immediately quit the **Site** in accordance with the provisions of Article 50.

54.2 The expense of completion permitted under Article 54.1, including any and all related and incidental costs, as so certified by the **Commissioner**, shall be charged against and deducted out of monies which have been earned by the **Contractor** prior to the date of the exercise of the right set forth in Article 54.1; the balance of such monies, if any, subject to the other provisions of this **Contract**, to be paid to the **Contractor** without interest after such completion. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

54.3 The previous provisions of this Chapter X shall be in addition to any and all other remedies available under **Law** or in equity.

54.4 The exercise by the **City** of any remedy set forth herein shall not be deemed a waiver by the **City** of any other legal or equitable remedy contained in this **Contract** or provided under **Law**.

CHAPTER XI: MISCELLANEOUS PROVISIONS

ARTICLE 55. CONTRACTOR'S WARRANTIES

55.1 In consideration of, and to induce, the award of this **Contract** to the **Contractor**, the **Contractor** represents and warrants:

55.1.1 That it is financially solvent, sufficiently experienced and competent to perform the **Work**; and

55.1.2 That the facts stated in its bid and the information given by it pursuant to the Information for Bidders is true and correct in all respects; and

55.1.3 That it has read and complied with all requirements set forth in the **Contract**.

ARTICLE 56. CLAIMS AND ACTIONS THEREON

56.1 Any claim, that is not subject to dispute resolution under the **PPB** Rules or this **Contract**, against the **City** for damages for breach of **Contract** shall not be made or asserted in any action, unless the **Contractor** shall have strictly complied with all requirements relating to the giving of notice and of information with respect to such claims, as herein before provided.

56.2 Nor shall any action be instituted or maintained on any such claims unless such action is commenced within six (6) months after **Substantial Completion**; except that:

56.2.1 Any claims arising out of events occurring after **Substantial Completion** and before **Final Acceptance** of the **Work** shall be asserted within six (6) months of **Final Acceptance** of the **Work**;

56.2.2 If the **Commissioner** exercises his/her right to complete or cause to complete any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List** pursuant to Article 54, any such action shall be commenced within six (6) months from the date the **Commissioner** notifies the **Contractor** in writing that he/she has exercised such right. Any claims for monies deducted, retained or withheld under the provisions of this **Contract** shall be asserted within six (6) months after the date when such monies otherwise become due and payable hereunder; and

56.2.3 If the **Commissioner** exercises his/her right to terminate the **Contract** pursuant to Article 64, any such action shall be commenced within six (6) months of the date the **Commissioner** exercises said right.

ARTICLE 57. INFRINGEMENT

57.1 The **Contractor** shall be solely responsible for and shall defend, indemnify, and hold the **City** harmless from any and all claims (even if the allegations of the lawsuit are without merit) and judgments for damages and from costs and expenses to which the **City** may be subject to or which it may suffer or incur allegedly arising out of or in connection with any infringement by the **Contractor** of any copyright, trade secrets, trademark or patent rights or any other property or personal right of any third party by the **Contractor** and/or its **Subcontractors** in the performance or completion of the **Work**. Insofar as the facts or **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent permitted by **Law**.

ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any official, agent or employee of the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICE OF NOTICES

59.1 The **Contractor** hereby designates the business address, fax number, and email address specified in its bid, as the place where all notices, directions or other communications to the **Contractor** may be delivered, or to which they may be mailed. Any notice, direction, or communication from either party to the other shall be in writing and shall be deemed to have been given when (i) delivered personally; (ii) sent by certified mail, return receipt requested; (iii) delivered by overnight or same day courier service in a properly addressed envelope with confirmation; or (iv) sent by fax or email and, unless receipt of the fax or e-mail is acknowledged by the recipient by fax or e-mail, deposited in a post office box regularly maintained by the United States Postal Service in a properly addressed, postage pre-paid envelope.

59.2 **Contractor's** notice address, email address, or fax number may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor**, and delivered to the **Commissioner**.

59.3 Nothing herein contained shall, however, be deemed to preclude or render inoperative the service of any notice, direction or other communication upon the **Contractor** personally, or, if the **Contractor** is a corporation, upon any officer thereof.

ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT

60.1 If this **Contract** contains any unlawful provision not an essential part of the **Contract** and which shall not appear to have been a controlling or material inducement to the making thereof, the same shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the **Contract** without affecting the binding force of the remainder.

ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED

61.1 It is the intent and understanding of the parties to this **Contract** that each and every provision of **Law** required to be inserted in this **Contract** shall be and is inserted herein. Furthermore, it is hereby stipulated that every such provision is to be deemed to be inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this **Contract** shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the **Law** and without prejudice to the rights of either party hereunder.

ARTICLE 62. TAX EXEMPTION

62.1 The **City** is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes of the State of New York and its cities and counties on all tangible personal property sold to the **City** pursuant to the provisions of this **Contract**. These taxes are not to be included in bids. However, this exemption does not apply to tools, machinery, equipment or other property leased by or to the **Contractor**, **Subcontractor** or **Materialman** or to tangible personal property which, even

though it is consumed, is not incorporated into the completed **Work** (consumable supplies) and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**. The **Contractor** and its **Subcontractors** and **Materialmen** shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all tangible personal property, other than consumable supplies and other tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**, that is required, necessary or proper for or incidental to the construction of the **Project** covered by this **Contract**. The sum paid under this **Contract** for such tangible personal property shall be in full payment and consideration for the sale of such tangible personal property.

62.2.1 The **Contractor** agrees to construct the **Project** and to perform all **Work**, labor and services rendered, necessary, proper or incidental thereto for the sum shown in the bid for the performance of such **Work**, labor, and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, and services, shall be in full consideration for the performance by the **Contractor** of all its duties and obligations under this **Contract** in connection with said **Work,** labor, and services.

62.3 20 NYCRR Section 541.3(d) provides that a **Contractor**'s purchases of tangible personal property that is either incorporated into real property owned by a governmental entity or purchased for and sold to a governmental entity are exempt from sales and use tax. The **City** shall not pay sales tax for any such tangible personal property that it purchases from the **Contractor** pursuant to the **Contract.** With respect to such tangible personal property, the **Contractor**, at the request of the **City**, shall furnish to the **City** such bills of sale and other instruments as may be required by the **City**, properly executed, acknowledged and delivered assuring to the **City** title to such tangible personal property, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such tangible personal property as the property of the **City**.

62.4 Title to all tangible personal property to be sold by the **Contractor** to the **City** pursuant to the provisions of the **Contract** shall immediately vest in and become the sole property of the **City** upon delivery of such tangible personal property to the **Site**. Notwithstanding such transfer of title, the **Contractor** shall have the full and continuing responsibility to install such tangible personal property in accordance with the provisions of this **Contract**, protect it, maintain it in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional tangible personal property in place of any that may be lost, stolen or rendered unusable, without cost to the **City**, until such time as the **Work** covered by the **Contract** is fully accepted by the **City**. Such transfer of title shall in no way affect any of the **Contractor's** obligations hereunder. In the event that, after title has passed to the **City**, any of the tangible personal property is rejected as being defective or otherwise unsatisfactory, title to all such tangible personal property shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** or **Materialmen** of tangible personal property to be sold hereunder shall be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid sales and compensating use taxes, provided that the subcontracts and purchase agreements provide for the resale of such tangible personal property and that such subcontracts and purchase agreements are in a form similar to this **Contract** with respect to the separation of the sale of consumable supplies and tangible personal property that the

Contractor is required to remove from the **Site** during or upon completion of the **Work** from the **Work** and labor, services, and any other matters to be provided, and provided further that the subcontracts and purchase agreements provide separate prices for tangible personal property and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for tangible personal property from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and **Materialmen** shall furnish a **Contractor** Exempt Purchase Certificate to all persons, firms or corporations from which they purchase tangible personal property for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this Article 62 shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this Article 62 shall control.

ARTICLE 63. INVESTIGATION(S) CLAUSE

63.1 The parties to this **Contract** agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a United States, a State of New York (State) or a **City** governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry.

63.2 If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision or public authority thereof, or the Port Authority of New York and New Jersey, or any local development corporation within the **City**, or any public benefit corporation organized under the **Laws** of the State of New York, or;

63.3 If any person refuses to testify for a reason other than the assertion of his/her privilege against self incrimination in an investigation, audit or inquiry conducted by a **City** or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interest in, and is seeking testimony concerning the award of, or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision thereof or any local development corporation within the **City**, then;

63.4 The **Commissioner** whose **Agency** is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license shall convene a hearing, upon not less than five (5) **Days**' written notice to the parties involved to determine if any penalties should attach for the failure of a person to testify.

63.5 If any non-governmental party to the hearing requests an adjournment, the **Commissioner** who convened the hearing may, upon granting the adjournment, suspend any contract, lease, permit, or license, pending the final determination pursuant to Article 63.7 without the **City** incurring any penalty or damages for delay or otherwise.

63.6 The penalties which may attach after a final determination by the **Commissioner** may include but shall not exceed:

63.6.1 The disqualification for a period not to exceed five (5) years from the date of an adverse determination for any person, or any entity of which such person was a member at the time the testimony was sought, from submitting bids for, or transacting business with, or entering into or obtaining any contract, lease, permit or license with or from the **City**; and/or

63.6.2 The cancellation or termination of any and all such existing **City** contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this **Contract**, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the **City** incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals, or fees accrued prior to the cancellation or termination shall be paid by the **City**.

63.7 The **Commissioner** shall consider and address in reaching his/her determination and in assessing an appropriate penalty the factors in Articles 63.7.1 and 63.7.2. The **Commissioner** may also consider, if relevant and appropriate, the criteria established in Articles 63.7.3 and 63.7.4, in addition to any other information which may be relevant and appropriate:

63.7.1 The party's good faith endeavors or lack thereof to cooperate fully and faithfully with any governmental investigation or audit, including but not limited to the discipline, discharge, or disassociation of any person failing to testify, the production of accurate and complete books and records, and the forthcoming testimony of all other members, agents, assignees or fiduciaries whose testimony is sought.

63.7.2 The relationship of the person who refused to testify to any entity that is a party to the hearing, including but not limited to, whether the person whose testimony is sought has an ownership interest in the entity and/or the degree of authority and responsibility the person has within the entity.

63.7.3 The nexus of the testimony sought to the subject entity and its contracts, leases, permits or licenses with the **City**.

63.7.4 The effect a penalty may have on an unaffiliated and unrelated party or entity that has a significant interest in an entity subject to penalties under Article 63.6, provided that the party or entity has given actual notice to the **Commissioner** upon the acquisition of the interest, or at the hearing called for in Article 63.4, gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity shall present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

63.8 Definitions:

63.8.1 The term "license" or "permit" as used in this Article 63 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

63.8.2 The term "person" as used in this Article 63 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

63.8.3 The term "entity" as used in this Article 63 shall be defined as any firm, partnership, corporation, association, joint venture, or person that receives monies, benefits, licenses, leases, or permits from or through the **City** or otherwise transacts business with the **City**.

63.8.4 The term "member" as used in this Article 63 shall be defined as any person associated with another person or entity as a partner, director, officer, principal or employee.

63.9 In addition to and notwithstanding any other provision of this **Contract**, the **Commissioner** may in his/her sole discretion terminate this **Contract** upon not less than three (3) **Days'** written notice in the event the **Contractor** fails to promptly report in writing to the **Commissioner** of the Department of Investigations ("DOI") of the **City** any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the **City** or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this **Contract** by the **Contractor**, or affecting the performance of this **Contract**.

ARTICLE 64. TERMINATION BY THE CITY

64.1 In addition to termination pursuant to any other article of this **Contract**, the **Commissioner** may, at any time, terminate this **Contract** by written notice to the **Contractor**. In the event of termination, the **Contractor** shall, upon receipt of such notice, unless otherwise directed by the **Commissioner**:

64.1.1 Stop **Work** on the date specified in the notice;

64.1.2 Take such action as may be necessary for the protection and preservation of the **City's** materials and property;

64.1.3 Cancel all cancelable orders for material and equipment;

64.1.4 Assign to the **City** and deliver to the **Site** or another location designated by the **Commissioner**, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract** and not incorporated in the **Work**;

64.1.5 Take no action which will increase the amounts payable by the **City** under this **Contract**.

64.2 In the event of termination by the **City** pursuant to this Article 64, payment to the **Contractor** shall be in accordance with Articles 64.2.1, 64.2.2 or 64.2.3, to the extent that each respective article applies.

64.2.1 Lump Sum Contracts or Items: On all lump sum **Contracts**, or on lump sum items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.1(a) and 64.2.1(b), less all payments previously made pursuant to this **Contract**. On lump sum **Contracts** only, the **City** will also pay the **Contractor** an additional sum as provided in Article 64.2.1(c).

64.2.1(a) For **Work** completed prior to the notice of termination, the **Contractor** shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the **Work**, as determined by the

Commissioner. For the purpose of determining the pro rata portion of the lump sum bid amount to which the **Contractor** is entitled, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be dispositive. The **Commissioner's** determination hereunder shall be final, binding, and conclusive.

64.2.1(b) For non-cancelable material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated in the **Work**, the **Contractor** shall be paid the lesser of the following, less salvage value:

64.2.1(b)(i) The Direct Cost, as defined in Article 64.2.4; or

64.2.1(b)(ii) The fair and reasonable value, if less than Direct Cost, of such material and equipment, plus necessary and reasonable delivery costs.

64.2.1(b)(iii) In addition, the **Contractor** shall be paid five (5%) percent of the amount described in Article 64.2.1(b)(i) or Article 64.2.1(b)(ii), whichever applies.

64.2.1(c) Except as otherwise provided in Article 64.2.1(d), on all lump sum **Contracts**, the **Contractor** shall be paid the percentage indicated below applied to the difference between the total lump sum bid amount and the total of all payments made prior to the notice of termination plus all payments allowed pursuant to Articles 64.2.1(a) and 64.2.1(b):

64.2.1(c)(i) Five (5%) percent of the first five million ($5,000,000) dollars; and

64.2.1(c)(ii) Three (3%) percent of any amount between five million ($5,000,000) dollars and fifteen million ($15,000,000) dollars; plus

64.2.1(c)(iii) One (1%) percent of any amount over fifteen million ($15,000,000) dollars.

64.2.1(d) In the event the **City** terminates a lump sum **Contract** pursuant to this Article 64 within ninety (90) **Days** after registration of the **Contract** with the **Comptroller**, the **Contractor** shall be paid one (1%) percent of the difference between the lump sum bid amount and the total of all payments made pursuant to this Article 64.2.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.2(a) and 64.2.2(b), less all payments previously made pursuant to this **Contract**:

64.2.2(a) For all completed units, the unit price stated in the **Contract**, and

64.2.2(b) For units that have been ordered but are only partially completed, the **Contractor** will be paid:

64.2.2(b)(i) A pro rata portion of the unit price stated in the **Contract** based upon the percent completion of the unit and

64.2.2(b)(ii) For non-cancelable material and equipment, payment will be made pursuant to Article 64.2.1(b).

64.2.3 Time and Materials Contracts or Items Based on Time and Material Records: On all **Contracts** or items in a **Contract** where payment for the **Work** is based on time and material records, the **Contractor** shall be paid in accordance with Article 26, less all payments previously made pursuant to this **Contract**.

64.2.4 Direct Costs: Direct Costs as used in this Article 64.2 shall mean:

64.2.4(a) The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,

64.2.4(b) The actual cost of labor involved in construction and installation at the **Site**, and

64.2.4(c) The actual cost of necessary bonds and insurance purchased pursuant to requirements of this **Contract** less any amounts that have been or should be refunded by the **Contractor's** sureties or insurance carriers.

64.2.4(d) Direct Costs shall not include overhead.

64.3 In no event shall any payments under this Article 64 exceed the **Contract** price for such items.

64.4 All payments pursuant to Article 64 shall be in the nature of liquidated damages and shall be accepted by the **Contractor** in full satisfaction of all claims against the **City**.

64.5 The **City** may deduct or set off against any sums due and payable pursuant to this Article 64, any deductions authorized by this **Contract** or by **Law** (including but not limited to liquidated damages) and any claims it may have against the **Contractor**. The **City's** exercise of the right to terminate the **Contract** pursuant to this Article 64 shall not impair or otherwise effect the **City's** right to assert any claims it may have against the **Contractor** in a plenary action.

64.6 Where the **Work** covered by the **Contract** has been substantially completed, as determined in writing by the **Commissioner**, termination of the **Work** shall be handled as an omission of **Work** pursuant to Articles 29 and 33, in which case a change order will be issued to reflect an appropriate reduction in the **Contract** sum, or if the amount is determined after final payment, such amount shall be paid by the **Contractor**.

ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

65.1 This **Contract** shall be deemed to be executed in the **City** regardless of the domicile of the **Contractor**, and shall be governed by and construed in accordance with the **Laws** of the State of New York and the **Laws** of the United States, where applicable.

65.2 The parties agree that any and all claims asserted against the **City** arising under this **Contract** or related thereto shall be heard and determined in the courts of the State of New York ("New York State Courts") located in the **City** and County of New York. To effect this **Contract** and intent, the **Contractor** agrees:

65.2.1 If the **City** initiates any action against the **Contractor** in Federal court or in a New York State Court, service of process may be made on the **Contractor** either in person, wherever such **Contractor** may be found, or by registered mail addressed to the **Contractor** at its address as set forth in this **Contract**, or to such other address as the **Contractor** may provide to the **City** in writing; and

65.2.2 With respect to any action between the **City** and the **Contractor** in a New York State Court, the **Contractor** hereby expressly waives and relinquishes any rights it might otherwise have:

65.2.2(a) To move to dismiss on grounds of forum non conveniens;

65.2.2(b) To remove to Federal Court; and

65.2.2(c) To move for a change of venue to a New York State Court outside New York County.

65.2.3 With respect to any action brought by the **City** against the **Contractor** in a Federal Court located in the **City**, the **Contractor** expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the **City**.

65.2.4 If the **Contractor** commences any action against the **City** in a court located other than in the **City** and County of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a New York State Court of competent jurisdiction located in the **City** and County of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the **Contractor** shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a New York State Court of competent jurisdiction in New York County.

65.3 If any provision(s) of this Article 65 is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT

66.1 The **Contractor** agrees that neither the **Contractor** nor any substantially owned affiliated company is participating or shall participate in an international boycott in violation of the provisions of the Federal Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce (Commerce Department) promulgated thereunder.

66.2 Upon the final determination by the Commerce Department or any other agency of the United States as to, or conviction of the **Contractor** or a substantially-owned affiliated company thereof for participation in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, the **Comptroller** may, at his/her option, render forfeit and void this **Contract**.

66.3 The **Contractor** shall comply in all respects, with the provisions of Section 6-114 of the Administrative Code and the rules and regulations issued by the **Comptroller** thereunder.

ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM

67.1 This **Contract** is subject to the requirements of Section 6-108.1 of the Administrative Code and regulations promulgated thereunder. No construction contract shall be awarded unless and until these requirements have been complied with in their entirety; however, compliance with this Article 67 is not required if the Agency sets Subcontractor Participation Goals for Minority- and Women-Owned Business Enterprises (M/WBEs).

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the **City** Department of Business Services, if any portion of the **Contract** is subcontracted, not less than ten (10%) percent of the total dollar amount of the **Contract** shall be awarded to locally based enterprises (LBEs); except that where less than ten (10%) percent of the total dollar amount of the **Contract** is subcontracted, such lesser percentage shall be so awarded.

67.3 The **Contractor** shall not require performance and payment bonds from LBE **Subcontractors**.

67.4 If the **Contractor** has indicated prior to award that no **Work** will be subcontracted, no **Work** shall be subcontracted without the prior approval of the **Commissioner**, which shall be granted only if the **Contractor** makes a good faith effort beginning at least six (6) weeks before the **Work** is to be performed to obtain LBE **Subcontractors** to perform the **Work**.

67.5 If the **Contractor** has not identified sufficient LBE **Subcontractors** prior to award, it shall sign a letter of compliance stating that it complies with Section 6-108.1 of the Administrative Code, recognizes that achieving the LBE requirement is a condition of its **Contract**, and shall submit documentation demonstrating its good faith efforts to obtain LBEs. After award, the **Contractor** shall begin to solicit LBE's to perform subcontracted **Work** at least six (6) weeks before the date such **Work** is to be performed and shall demonstrate that a good faith effort has been made to obtain LBEs on each subcontract until it meets the required percentage.

67.6 Failure of the **Contractor** to comply with the requirements of Section 6-108.1 of the Administrative Code and the regulations promulgated thereunder shall constitute a material breach of this **Contract**. Remedy for such breach may include the imposition of any or all of the following sanctions:

67.6.1 Reducing the **Contractor's** compensation by an amount equal to the dollar value of the percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 If the **Contractor** is an LBE, de-certifying and declaring the **Contractor** ineligible to participate in the LBE program for a period of up to three (3) years.

ARTICLE 68. ANTITRUST

68.1 The **Contractor** hereby assigns, sells, and transfers to the **City** all right, title, and interest in and to any claims and causes of action arising under the antitrust **Laws** of New York State or of the United States relating to the particular goods or services purchased or procured by the **City** under this **Contract**.

ARTICLE 69. MacBRIDE PRINCIPLES PROVISIONS

69.1 Notice To All Prospective **Contractors**:

69.1.1 Local Law No. 34 of 1991 became effective on September 10, 1991 and added Section 6-115.1 of the Administrative Code. The local **Law** provides for certain restrictions on **City Contracts** to express the opposition of the people of the **City** to employment discrimination practices in Northern Ireland to promote freedom of work-place opportunity.

69.1.2 Pursuant to Section 6-115.1, prospective **Contractors** for **Contracts** to provide goods or services involving an expenditure of an amount greater than ten thousand ($10,000.) dollars, or for construction involving an amount greater than fifteen thousand ($15,000.) dollars, are asked to sign a rider in which they covenant and represent, as a material condition of their **Contract**, that any business operations in Northern Ireland conducted by the **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** will be conducted in accordance with the MacBride Principles of nondiscrimination in employment.

69.1.3 Prospective **Contractors** are not required to agree to these conditions. However, in the case of **Contracts** let by competitive sealed bidding, whenever the lowest responsible bidder has not agreed to stipulate to the conditions set forth in this notice and another bidder who has agreed to stipulate to such conditions has submitted a bid within five (5%) percent of the lowest responsible bid for a **Contract** to supply goods, services or contraction of comparable quality, the **Agency** shall refer such bids to the Mayor, the Speaker or other officials, as appropriate, who may determine, in accordance with applicable **Law**, that it is in the best interest of the **City** that the **Contract** be awarded to other than the lowest responsible pursuant to Section 313(b)(2) of the **City** Charter.

69.1.4 In the case of **Contracts** let by other than competitive sealed bidding, if a prospective **Contractor** does not agree to these conditions, no **Agency**, elected official or the **City** Council shall award the **Contract** to that bidder unless the **Agency** seeking to use the goods, services or construction certifies in writing that the **Contract** is necessary for the **Agency** to perform its functions and there is no other responsible **Contractor** who will supply goods, services or construction of comparable quality at a comparable price.

69.2 In accordance with Section 6-115.1 of the Administrative Code, the **Contractor** stipulates that such **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** either:

69.2.1 Have no business operations in Northern Ireland, or

69.2.2 Shall take lawful steps in good faith to conduct any business operations they have in Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

69.3 For purposes of this Article, the following terms shall have the following meanings:

69.3.1 “MacBride Principles” shall mean those principles relating to nondiscrimination in employment and freedom of work-place opportunity which require employers doing business in Northern Ireland to:

69.3.1(a) increase the representation of individuals from under-represented religious groups in the workforce, including managerial, supervisory, administrative, clerical and technical jobs;

69.3.1(b) take steps to promote adequate security for the protection of employees from under-represented religious groups both at the work-place and while traveling to and from **Work**;

69.3.1(c) ban provocative religious or political emblems from the workplace;

69.3.1(d) publicly advertise all job openings and make special recruitment efforts to attract applicants from under-represented religious groups;

69.3.1(e) establish layoff, recall, and termination procedures which do not in practice favor a particular religious group;

69.3.1(f) abolish all job reservations, apprenticeship restrictions and different employment criteria which discriminate on the basis of religion;

69.3.1(g) develop training programs that will prepare substantial numbers of current employees from under-represented religious groups for skilled jobs, including the expansion of existing programs and the creation of new programs to train, upgrade, and improve the skills of workers from under-represented religious groups;

69.3.1(h) establish procedures to asses, identify, and actively recruit employees from under-represented religious groups with potential for further advancement; and

69.3.1(i) appoint a senior management staff member to oversee affirmative action efforts and develop a timetable to ensure their full implementation.

69.4 The **Contractor** agrees that the covenants and representations in Article 69.2 are material conditions to this **Contract**. In the event the **Agency** receives information that the **Contractor** who made the stipulation required by this Article 69 is in violation thereof, the **Agency** shall review such information and give the **Contractor** an opportunity to respond. If the **Agency** finds that a violation has occurred, the **Agency** shall have the right to declare the **Contractor** in default in default and/or terminate this **Contract** for cause and procure supplies, services or **Work** from another source in the manner the **Agency** deems proper. In the event of such termination, the **Contractor** shall pay to the **Agency**, or the **Agency** in its sole discretion may withhold from any amounts otherwise payable to the **Contractor**, the difference between the **Contract** price for the uncompleted portion of this **Contract** and the cost to the **Agency** of completing performance of this **Contract** either itself or by engaging another **Contractor** or **Contractors**. In the case of a requirement **Contract**, the **Contractor** shall be liable for such difference in price for the entire amount of supplies required by the **Agency** for the uncompleted term of **Contractor's Contract**. In the case of a construction **Contract**, the **Agency** shall also have the right to hold the **Contractor** in partial or total default in accordance with the default provisions of this **Contract**, and/or may seek debarment or suspension of the **Contractor**. The rights and remedies of the **Agency** hereunder shall be in addition to, and not in lieu of, any rights and remedies the **Agency** has pursuant to this **Contract** or by operation of **Law**.

ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB

70.1 The **Contractor** shall electronically file all alteration type-2 and alteration type-3 applications via the New York City Development Hub Web site, except applications for the following types of minor alterations: enlargements, curb cuts, legalizations, fire alarms, builders pavement plans, and jobs filed on Landmark Preservation Commission calendared properties. All such filings must be professionally certified. Information about electronic filing via the New York City Development Hub is available on the **City** Department of Buildings Web site at www.nyc.gov/buildings.

ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS

71.1 Tropical hardwoods, as defined in Section 165 of the New York State Finance Law (Finance Law), shall not be utilized in the performance of this **Contract** except as expressly permitted by Section 165 of the Finance Law.

ARTICLE 72. CONFLICTS OF INTEREST

72.1 Section 2604 of the **City** Charter and other related provisions of the **City** Charter, the Administrative Code, and the Penal Law are applicable under the terms of this **Contract** in relation to conflicts of interest and shall be extended to **Subcontractors** authorized to perform **Work**, labor and services pursuant to this **Contract** and further, it shall be the duty and responsibility of the **Contractor** to so inform its respective **Subcontractors**. Notice is hereby given that, under certain circumstances, penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

ARTICLE 73. MERGER CLAUSE

73.1 The written **Contract** herein, contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this **Contract** shall be deemed to exist or to bind any of the parties hereto, or to vary any of the terms contained herein.

ARTICLE 74. STATEMENT OF WORK

74.1 The **Contractor** shall furnish all labor and materials and perform all **Work** in strict accordance with the **Specifications** and **Addenda** thereto, numbered as shown in Schedule A.

ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR

75.1 The **City** will pay and the **Contractor** will accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum shown in Schedule A, this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract**.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the **Contractor** agrees to accept payments under this **Contract** from the **City** by electronic funds transfer (EFT). An EFT is any

transfer of funds, other than a transaction originated by check, draft or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorize a financial institution to debit or credit an account. Prior to the first payment made under this **Contract**, the **Contractor** shall designate one financial institution or other authorized payment agent and shall complete the attached "EFT Vendor Payment Enrollment Form" in order to provide the Commissioner of the **City** Department of Finance with information necessary for the **Contractor** to receive electronic funds transfer payments through a designated financial institution or authorized payment agent. The crediting of the amount of a payment to the appropriate account on the books of a financial institution or other authorized payment agent designated by the **Contractor** shall constitute full satisfaction by the **City** for the amount of the payment under this **Contract**. The account information supplied by the **Contractor** to facilitate the electronic funds transfer shall remain confidential to the fullest extent provided by **Law**.

76.2 The **Commissioner** may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the **City** Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to which the **Agency** may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications or types of checks; or (iii) in other circumstances as may be necessary in the interest of the **City**.

ARTICLE 77. RECORDS RETENTION

77.1 The **Contractor** agrees to retain all books, records, and other documents relevant to this **Contract** for six years after the final payment or termination of this **Contract**, whichever is later. **City**, state, and federal auditors and any other persons duly authorized by the **City** shall have full access to and the right to examine any such books, records, and other documents during the retention period.

ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS

78.1 Pre-Bidding (Investigation) Viewing of Site – Bidders must carefully view and examine the **Site** of the proposed **Work**, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions and hazards on, about or above the **Site** relating to or affecting in any way the performance of the **Work** to be done under the **Contract** that were or should have been known by a reasonably prudent bidder. To arrange a date for visiting the **Site**, bidders are to contact the **Agency** contact person specified in the bid documents.

78.2 Should the **Contractor** encounter during the progress of the Work site conditions or environmental hazards at the **Site** materially differing from any shown on the **Contract Drawings** or indicated in the **Specifications** or such conditions or environmental hazards as could not reasonably have been anticipated by the **Contractor**, which conditions or hazards will materially affect the cost of the **Work** to be done under the **Contract**, the attention of the **Commissioner** must be called immediately to such conditions or hazards before they are disturbed. The **Commissioner** shall thereupon promptly investigate the conditions or hazards. If the **Commissioner** finds that they do so materially differ, and that they could not have been reasonably anticipated by the **Contractor**, the **Contract** may be modified with the **Commissioner**'s written approval.

2017 Standard Construction Contract Riders:

- NYC Earned Safe and Sick Time Act Contract Rider
- Rider to New York City Standard Construction Contract (March 2017) Regarding Non-Compensable Delays and Grounds for Extension
- Rider to New York City Standard Construction Contract (March 2017) Regarding Certified Payrolls
- Community Hiring Rider for Construction Contracts (version: February 20, 2025)

NYC EARNED SAFE AND SICK TIME ACT CONTRACT RIDER

(To supersede Section 4.06 of the November 2018 Appendix A and Section 35.5 of the March 2017 Standard Construction Contract and to be attached to other City contracts and solicitations)

A. *Introduction and General Provisions.*

1. The Earned Safe and Sick Time Act ("ESSTA"), codified at Title 20, Chapter 8 of the New York City Administrative Code, also known as the "Paid Safe and Sick Leave Law," requires covered employees (as defined in Admin. Code § 20-912) in New York City ("City") to be provided with paid safe and sick time. Contractors of the City or of other governmental entities may be required to provide safe and sick time pursuant to the ESSTA. The ESSTA is enforced by the City's Department of Consumer and Worker Protection ("DCWP"), which has promulgated 6 RCNY §§ 7-101 and 201 *et seq*. ("DCWP Rules").

2. The Contractor agrees to comply in all respects with the ESSTA and the DCWP Rules, and as amended, if applicable, in the performance of this agreement. The Contractor further acknowledges that such compliance is a material term of this agreement and that failure to comply with the ESSTA in performance of this agreement may result in its termination.

3. The Contractor must notify (with a copy to DCWP at ComplianceMonitoring@dcwp.nyc.gov) the Agency Chief Contracting Officer of the City Agency or other entity with whom it is contracting in writing within 10 days of receipt of a complaint (whether oral or written) or notice of investigation regarding the ESSTA involving the performance of this agreement. Additionally, the Contractor must cooperate with DCWP's guidance and must comply with DCWP's subpoenas, requests for information, and other document demands as set forth in the ESSTA and the DCWP Rules. More information is available at https://www1.nyc.gov/site/dca/about/paid-sick-leave-what-employers-need-to-know.page.

4. Upon conclusion of a DCWP investigation, Contractor will receive a findings letter detailing any employee relief and civil penalties owed. Pursuant to the findings, Contractor will have the opportunity to settle any violations and cure the breach of this agreement caused by failure to comply with the ESSTA either i) without a trial by entering into a consent order or ii) appearing before an impartial judge at the City's administrative tribunal. In addition to and notwithstanding any other rights and remedies available to the City, non-payment of relief and penalties owed pursuant to a consent order or final adjudication within 30 days of such consent order or final adjudication may result in the termination of this agreement without further opportunity to settle or cure the violations.

5. The ESSTA is briefly summarized below for the convenience of the Contractor. The Contractor is advised to review the ESSTA and the DCWP Rules in their entirety. The Contractor may go to www.nyc.gov/PaidSickLeave for resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the Contractor can get more information about how to comply with the ESSTA and the DCWP Rules. The Contractor acknowledges that it is responsible for compliance with the ESSTA and the DCWP Rules notwithstanding any inconsistent language contained herein.

B. *Pursuant to the ESSTA and DCWP Rules: Applicability, Accrual, and Use.*

1. An employee who works within the City must be provided paid safe and sick time.[1] Employers with one hundred or more employees are required to provide 56 hours of safe and sick time for an employee each calendar year. Employers with fewer than one hundred employees are required to provide 40 hours of sick leave each calendar year. Employers must provide a minimum of one hour of safe and sick time for every 30 hours worked by an employee and compensation for such safe and sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage at the time the paid safe or sick time is taken. Employers are not discouraged or prohibited from providing more generous safe and sick time policies than what the ESSTA requires.

2. Employees have the right to determine how much safe and sick time they will use, provided that an employer may set a reasonable minimum increment for the use of safe and sick time not to exceed four hours per day. For the use of safe time or sick time beyond the set minimum increment, an employer may set fixed periods of up to thirty minutes beyond the minimum increment. In addition, an employee may carry over up to 40 or 56 hours of unused safe and sick time to the following calendar year, provided that no employer is required to carry over unused paid safe and sick time if the employee is paid for such unused safe and sick time and the employer provides the employee with at least the legally required amount of paid safe and sick time for such employee for the immediately subsequent calendar year on the first day of such calendar year.

3. An employee entitled to safe and sick time pursuant to the ESSTA may use safe and sick time for any of the following:

a. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;

b. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild, or grandparent, the child or parent of an employee's spouse or domestic partner, any other individual related by blood to the employee, and any other individual whose close association with the employee is the equivalent of a family relationship) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

[1] Pursuant to the ESSTA, if fewer than five employees work for the same employer, and the employer had a net income of less than one million dollars during the previous tax year, such employer has the option of providing such employees uncompensated safe and sick time.

c. closure of such employee's place of business by order of a public official due to a public health emergency;

d. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency; or

e. when the employee or a family member has been the victim of a family offense matter, sexual offense, stalking, or human trafficking:

1. to obtain services from a domestic violence shelter, rape crisis center, or other shelter or services program for relief from a family offense matter, sexual offense, stalking, or human trafficking;
2. to participate in safety planning, temporarily or permanently relocate, or take other actions to increase the safety of the employee or employee's family members from future family offense matters, sexual offenses, stalking, or human trafficking;
3. to meet with a civil attorney or other social service provider to obtain information and advice on, and prepare for or participate in any criminal or civil proceeding, including but not limited to, matters related to a family offense matter, sexual offense, stalking, human trafficking, custody, visitation, matrimonial issues, orders of protection, immigration, housing, discrimination in employment, housing or consumer credit;
4. to file a complaint or domestic incident report with law enforcement;
5. to meet with a district attorney's office;
6. to enroll children in a new school; or
7. to take other actions necessary to maintain, improve, or restore the physical, psychological, or economic, health or safety of the employee or the employee's family member or to protect those who associate or work with the employee.

4. An employer must not require an employee, as a condition of taking safe and sick time, to search for a replacement. However, where the employee's need for safe and sick time is foreseeable, an employer may require an employee to provide reasonable notice of the need to use safe and sick time. For an absence of more than three consecutive work days, an employer may require reasonable documentation that the use of safe and sick time was needed for a reason listed in Admin. Code § 20-914; and/or written confirmation that an employee used safe and sick time pursuant to the ESSTA. However, an employer may not require documentation specifying the nature of a medical condition, require disclosure of the details of a medical condition, or require disclosure of the details of a family offense matter, sexual offense, stalking, or human trafficking, as a condition of providing safe and sick time. Health information and information concerning family offenses, sexual offenses, stalking or human trafficking obtained solely due to an

employee's use of safe and sick time pursuant to the ESSTA must be treated by the employer as confidential. An employer must reimburse an employee for all reasonable costs or expenses incurred in obtaining such documentation for the employer.

5. An employer must provide to all employees a written policy explaining its method of calculating sick time, policies regarding the use of safe and sick time (including any permissible discretionary conditions on use), and policies regarding carry-over of unused time at the end of the year, among other topics. It must provide the policy to employees using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny safe and sick time to an employee because of non-compliance with such a policy.

6. An employer must provide a pay statement or other form of written documentation that informs the employee of the amount of safe/sick time accrued and used during the relevant pay period and the total balance of the employee's accrued safe/sick time available for use.

7. Safe and sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the safe and sick time was used.

C. *Exemptions and Exceptions*. Notwithstanding the above, the ESSTA does not apply to any of the following:

1. an independent contractor who does not meet the definition of employee under N.Y. Labor Law § 190(2);

2. an employee covered by a valid collective bargaining agreement, if the provisions of the ESSTA are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the ESSTA for such employee;

3. an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines their own schedule, has the ability to reject or accept any assignment referred to them, and is paid an average hourly wage that is at least four times the federal minimum wage;

4. an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

5. an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

6. a participant in a Work Experience Program (WEP) under N.Y. Social Services Law § 336-c.

D. *Retaliation Prohibited.* An employer shall not take any adverse action against an employee that penalizes the employee for, or is reasonably likely to deter the employee from or interfere with the employee exercising or attempting in good faith to exercise any right provided by the ESSTA. In addition, an employer shall not interfere with any investigation, proceeding, or hearing pursuant to the ESSTA.

E. *Notice of Rights.*

1. An employer must provide its employees with written notice of their rights pursuant to the ESSTA. Such notice must be in English and the primary language spoken by an employee, provided that DCWP has made available a translation into such language. Downloadable notices are available on DCWP's website at https://www1.nyc.gov/site/dca/about/Paid-Safe-Sick-Leave-Notice-of-Employee-Rights.page. The notice must be provided to the employees by a method that reasonably ensures personal receipt by the employee.

2. Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed $50.00 for each employee who was not given appropriate notice.

F. *Records*. An employer must retain records documenting its compliance with the ESSTA for a period of at least three years, and must allow DCWP to access such records in furtherance of an investigation related to an alleged violation of the ESSTA.

G. *Enforcement and Penalties.*

1. Upon receiving a complaint alleging a violation of the ESSTA, DCWP must investigate such complaint. DCWP may also open an investigation to determine compliance with the ESSTA on its own initiative. Upon notification of a complaint or an investigation by DCWP, the employer must provide DCWP with a written response and any such other information as DCWP may request. If DCWP believes that a violation of the ESSTA has occurred, it has the right to issue a notice of violation to the employer .

2. DCWP has the power to grant an employee or former employee all appropriate relief as set forth in Admin. Code § 20-924(d). Such relief may include, but is not limited to, treble damages for the wages that should have been paid; statutory damages for unlawful retaliation; and damages, including statutory damages, full compensation for wages and benefits lost, and reinstatement, for unlawful discharge. In addition, DCWP may impose on an employer found to have violated the ESSTA civil penalties not to exceed $500.00 for a first violation, $750.00 for a second violation within two years of the first violation, and $1,000.00 for each succeeding violation within two years of the previous violation. When an employer has a policy or practice of not providing or refusing to allow the use of safe and sick time to its employees, DCWP may seek penalties and relief on a per employee basis.

3. Pursuant to Admin. Code § 20-924.2, (a) where reasonable cause exists to believe that an employer is engaged in a pattern or practice of violations of the ESSTA, the Corporation Counsel may commence a civil action on behalf of the City in a court of competent jurisdiction by filing a complaint setting forth facts relating to such pattern or practice and requesting relief, which may include injunctive relief, civil penalties and any other appropriate relief. Nothing in § 20-924.2 prohibits DCWP from exercising its authority under section 20-924 or the Charter, provided that a civil action pursuant to § 20-924.2 shall not have previously been commenced.

H. *More Generous Polices and Other Legal Requirements.* Nothing in the ESSTA is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous safe and sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous safe and sick time. The ESSTA provides minimum requirements pertaining to safe and sick time and does not preempt, limit, or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of safe and sick leave or time, whether paid or unpaid, or that extends other protections to employees. The ESSTA may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING NON-COMPENSABLE DELAYS AND GROUNDS FOR EXTENSION

[Instructions to Agencies: Please attach this Rider to the March 2017 version of the New York City Standard Construction Contract]

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract:

1. Section **11.5.1** provides as follows:

   11.5.1 The acts or omissions of public or government bodies (other than **City** agencies) or of any third parties who are disclosed in the **Contract Documents,** or those third parties who are ordinarily encountered or who are generally recognized as related to the **Work**, including but not limited to, **Other Contractors**, utilities or private enterprises;

2. Section **11.5.6** provides as follows:

   11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God; acts of war or of the public enemy or terrorist acts; disruption, outage or power failure caused by a utility's inability or failure to provide service, pandemics, epidemics, outbreaks of infectious disease or any other public health emergency; other states of emergency declared by the City, State or Federal government , quarantine restrictions, and freight embargoes; including the **City's** reasonable responses to any of the above; and

3. Section **13.3** provides as follows:

   13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

   13.3.1 By any of the acts or omissions of the **City**, its officials, agents or employees set forth in Articles **11.4.1.1** through **11.4.1.9**; or

   13.3.2 By or attributable to any of the items set forth in Articles **11.5.1** through **11.5.7**.

   13.3.3 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING CERTIFIED PAYROLLS

[Instructions to Agencies: Please attach this Rider to the March 2017 version of the New York City Standard Construction Contract]

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract. Article 38 provides as follows:

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii), as modified by Labor Law Section 220-j. The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts into the Electronic Certified Payroll Database (as hereinafter defined). If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both at the same time payment requisitions are submitted and independently of its payment requisitions. For purposes of this Article 38, "Electronic Certified Payroll Record Database" means the City's publicly accessible online database of electronic certified payroll records through which contractors and subcontractors submit certified payroll reports in an electronic format. The database is accessible at the following link: https://nyc-oti.ecomply.us/

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

Community Hiring Rider

For Construction Contracts

Version: February 20, 2025

Program Description

Community Hiring, as authorized under Chapter 79 of the New York City Charter ("Charter"), is an initiative to set workforce goals on City procurement for contractors to employ low-income individuals and residents of economically disadvantaged communities.

The provisions set forth in this Rider shall apply to contracts with a total value exceeding three million dollars, unless otherwise exempt under the rules set forth under the Community Hiring Rules, adopted as Title 74 of the Rules of the City of New York (RCNY). Under 74 RCNY § 1-03(b), the following contracts are exempt: preferred source contracts; contracts for the performance of services by a city-affiliated not-for-profit corporation, goods contracts; contracts in an amount below the small purchase threshold; contracts for investigative or confidential services; contracts subject to federal or state funding requirements that preclude or substantially conflict with the application of Community Hiring Goals; contracts awarded through the United States General Services administration, or through the New York State Office of General Services; contracts for emergency demolition services procured by the Department of Housing Preservation and Development; contracts for which contractor selection is made by an elected official other than the Mayor or an agency other than a Mayoral Agency; contracts subject to 9 RCNY § 1-02(f); contracts designated for inclusion in a mentoring program as defined in Section 1206 or 1309 of the Charter; and contracts for banking services, electronic payment services, or other related services procured by the New York City Department of Finance.

The Community Hiring Rules are hereby incorporated in this Contract by reference and all terms used herein shall have the meanings given such terms in the Community Hiring Rules. In the event of any conflict between the Community Hiring Rules and this Rider, the rules shall control. As of the execution of this Contract, the Contactor represents that it has read, in its entirety, and agrees to comply with the Community Hiring Rules.

The Community Hiring program supersedes the HireNYC initiatives and the related riders, including, but not limited to references to the Public Assistance Commitment Rider and the HireNYC Hiring and Employment Rider. Article 35.6 of this Contract is amended and replaced with the Community Hiring Rules.

Community Hiring Requirements

The Contractor agrees to comply with the requirements of the Community Hiring Rules in the performance of this Contract.

A. Community Hiring Goal

Pursuant to 74 RCNY § 4-02(b), the Contractor shall make best efforts to meet the applicable Community Hiring Goal to employ Residence-Based Community Hires as defined in 74 RCNY § 2-01(a) for contracts involving construction work.

For each Contract involving Construction Work that is not subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the Community Hiring Goal of 30 percent of cumulative labor hours of construction work to be performed by Residence-Based Community Hires as established in 74 RCNY § 4-02(b)(1). For contracts involving Construction Work that are subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the numerical goal(s) regarding Residence-Based Community Hires and Apprentices established in such Project Labor Agreement.

In accordance with 74 RCNY § 5-01(b), the Contractor shall require its subcontractors, as defined under 74 RCNY § 1-02, to make best efforts to meet the applicable Community Hiring Goal.

B. Advertising Employment Opportunities

The Contractor, except those performing Construction Work pursuant to a Project Labor Agreement, agrees to advertise the Employment Opportunities, as defined in 74 RCNY § 1-02, in conspicuous places available to the public and in a manner reasonable for the industry.

For purposes of meeting a Community Hiring Goal, the Contractor shall notify a Referral Source, as provided in accordance with 74 RCNY § 3-02(a), of the job opportunities to be filled by Community Hires. The Contractor shall provide notice to the Office of Community Hiring and Workforce Development (OCH) when the Referral Source has impeded the Contractor's efforts to meet the Community Hiring Goal.

C. System Enrollment and Reporting

The Contractor shall enroll with an electronic system designated by the Director of OCH in accordance with 74 RCNY § 5-01(e).

Once enrolled into the system, the Contractor shall be responsible for updating the information in the system in a reasonable and timely manner.

The Contractor may fulfill the advertising requirement set forth in 74 RCNY § 5-01(c) by posting in such system all the relevant information of an Employment Opportunity to be filled by Community Hires. The Contractor shall also provide, upon request by the City with reasonable notice, any information related to the Contractor's compliance with or progress towards meeting the Community Hiring Goal.

Records

A. Retention

The Contractor shall maintain records in accordance with the applicable requirements set forth in 74 RCNY §§ 6-01 and 6-02.

For purposes of 74 RCNY § 6-01(b), the Contractor shall designate a representative to monitor all activity related to compliance to ensure that the Contractor is exercising best efforts to meet the Community Hiring Goal and maintain records to submit the documentation relating to the provisions herein.

B. Access to Records

The Contractor shall furnish, and require its subcontractors to furnish, all information and reports in accordance with the laws, rules, regulations or guidance from the City.

Compliance

Without limitation to any other provisions under this Contract and any other remedies available to the City, a failure to comply with the requirements under the Community Hiring Rules is a non-compliance that may be subject to civil penalties pursuant to Chapter 7 of the Community Hiring Rules and may be considered as a factor in evaluating contract performance in accordance with 9 RCNY § 4-01.

A. Best Efforts

Where the Contractor has failed to meet the Community Hiring Goal, the Contractor shall demonstrate that it exercised best efforts to meet the goal. Where determined, as set forth in 74 RCNY § 5-03, that the Contractor failed to make best efforts, the City shall send written notice to the Contractor's designated representative, notwithstanding the notice provisions in the Contract. The Contractor shall respond in accordance with the instructions in the notice. Failure to timely respond can result in a non-compliance determination subject to civil penalties as set forth in 74 RCNY § 7-01.

B. Corrective Action

Where the City determines that the non-compliance may be remedied through a corrective action and provides notice to the Contractor pursuant to 74 RCNY § 7-02(a)(2), the Contractor shall respond in accordance with the requirements outlined in the notice. The Contractor is responsible for timely demonstration of taking the requisite corrective action. Demonstration of corrective action to the satisfaction of the Director of OCH, may result in waiving of the civil penalties[1] as set forth in the Community Hiring Rules.

[1] Only civil penalties relating to non-compliance with the Community Hiring Rules can be waived in this instance.

C. Civil Penalties

Where Contractor is found non-compliant subject to civil penalties, the City can impose a civil penalty amount in accordance with the schedule set forth in 74 RCNY § 7-03.

The City may withhold from the Contractor the amount of the civil penalties upon final determination as set forth in 74 RCNY § 7-01(d).

BLANK PAGE

SIGNATURE OF THE CONTRACT

IN WITNESS WHEREOF, the Commissioner, on behalf of the City of New York and the Contractor, have executed **FIVE COPIES of this contract, three parts of which are to remain with the Commissioner, one other to be filed with the Comptroller of the City, and the fifth to be delivered to the Contractor.**

THE CITY OF NEW YORK

BY_____
COMMISSIONER

_____
NAME OF CONTRACTOR

BY_____
AUTHORIZED OFFICER OF THE FIRM OR CORPORATION

(Where Contractor is a Corporation, add):
Attest:

_____(Seal)
SECRETARY

BLANK PAGE

ACKNOWLEDGMENT BY CORPORATION

State of_____, County of_____ ss:

On this_____ day of _____, _____

before me personally came_____

who affirms or being by me duly sworn, did depose and say that he/she resides in

the City of_____; that he/she is the_____

of the _____the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation, that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his name thereto by like order.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY COMMISSIONER

State of New York, County of Queens ss:

On this_____ day of_____,_____

before me personally came_____

to me known and known to me to be the_____ Commissioner of the Department Environmental Protection of the City of New York, the person described as such in and who as such executed the foregoing instrument and he/she acknowledged to me that he/she executed the same as Commissioner for the purposes therein mentioned.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY PARTNERSHIP

State of_____, County of_____ ss:

On this_____ day of _____, _____

before me personally came _____,to be known

and known to me to be a member of_____, the firm described in and which executed the foregoing instrument and he/she acknowledged to me that he/she subscribed the name of said firm thereto on behalf of said firm for the purposes therein mentioned.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY INDIVIDUAL

State of _____, County of _____ ss:

On this_____ day of_____,_____

before me personally came_____

to me known and known to me to be the same person described and who executed the foregoing instrument and he/she acknowledged to me that he/she executed the same for the purposes therein mentioned

_____
Notary Public or Commissioner of Deeds

AUTHORITY

MAYOR'S CERTIFICATE NO. CBX _____ DATED_____

BUDGET DIRECTOR'S CERTIFICATE NO. CP/CAS_____ DATED_____

APPROPRIATION

COMMISSIONER'S CERTIFICATE

In conformity with the provisions of Section 6-101 of the Administrative Code of the City of New York, it is hereby certified that the estimated cost of the work, materials and supplies required by the within Contract, amounting to:

_____

$_____

is chargeable to the fund of the Department of Environmental Protection Budget Code(s):

_____

_____

I hereby certify that the specifications contained herein comply with the terms and conditions of the FY_____ BUDGET.

_____

Commissioner of the Department of Environmental Protection

COMPTROLLER'S CERTIFICATE

The City of New York_____,_____

In pursuance of the provisions of Section 6-101 of the Administrative Code of the City of New York, I hereby certify that there remains unapplied and unexpended a balance of the above mentioned fund applicable to this Contract sufficient to pay the estimated expense of executing the same, viz.:
$_____.

_____

Comptroller

BLANK PAGE

PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:,
That we,_____

hereinafter referred to as the "Principal,"
and,_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of_____

($ _____) Dollars, lawful money of the United States for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The Principal is about to enter, or has entered, into a Contract in writing with the City for

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts, damages, cost and judgments which may or shall be recovered against said City or its officers or agents or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that the City has determined that the Principal is in default of the Contract, to either (1) pay the full amount of the above penal sum in complete discharge and exoneration of this bond and of all the liabilities of the Surety relating to this bond, or (2) fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof. The Surety (Sureties) further agrees, at its option, either to tender the penal sum or to commence and diligently perform the Work specified in the Contract, including physical site work, within twenty-five (25) business days after written notice thereof from the City and to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to commence and to complete all Work as provided herein.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any Work to be performed or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

_____ day of _____ 20 _____ .

(Seal)

_____ (L.S.)

Principal

By _____.

(Seal)

Surety

By _____.

Performance Bond Greater Than $5 Million

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

Bond Premium Rate _____.

Bond Premium Cost _____.

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is the_____
of ___the corporation described in and which executed the foregoing instrument; and that he signed his name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is _____ partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds.

Affix Acknowledgments and justification of Sureties

PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:,
That we,_____

hereinafter referred to as the "Principal,"
and,_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of_____

($ _____) Dollars, lawful money of the United States for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The Principal is about to enter, or has entered, into a Contract in writing with the City for

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts, damages, cost and judgments which may or shall be recovered against said City or its officers or agents or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that the City has determined that the Principal is in default of the Contract, to (1) pay the City the cost to complete the contract as determined by the City in excess of the balance of the Contract held by the City, plus any damages or costs to which the City is entitled, up to the full amount of the above penal sum, (2) fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, or (3) tender a completion Contractor that is acceptable to the City. The Surety (Sureties) further agrees, at its option, either to notify the City that it elects to pay the city the cost of completion plus any applicable damages and costs under option (1) above, or to commence and diligently perform the Work specified in the Contract, including physical site work, within twenty-five (25) business days after written notice thereof from the City and, if the Surety elects to fully perform and complete the Work, then to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. If the Surety elects to tender payment pursuant to (1) above, then the Surety shall tender such amount within fifteen (15) business days notification from the City of the cost of completion. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to pay the City the cost of completion, to commence and complete all Work as provided herein, or to tender a completion contractor.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, and waivers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to subcontractors shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal. Notwithstanding the above, if the City makes payments to the Principal before the time required by the contract that in the aggregate exceed $100,000 or 10% of the Contract price, whichever is less, and that have not become earned prior to the Principal being found to be in default, then all payments made to the Principal before the time required by the Contract shall be added to the remaining contract value available to be paid for the completion of the Contract as if such sums had not been paid to the Principal, but shall not provide a basis for non-performance of its obligation to pay the City the cost of completion, to commence and to complete all Work as provided herein, or to tender a completion contractor

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

_____ day of _____ 20 _____ .

(Seal)

_____ (L.S.)

Principal

By _____.

(Seal)

Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

Bond Premium Rate _____.

Bond Premium Cost _____.

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is the_____
of ___the corporation described in and which executed the foregoing instrument; and that he signed his name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is _____ partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds.

Affix Acknowledgments and justification of Sureties

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we,

_____

_____

_____

hereinafter referred to as the "Principal" and

_____

_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns, in the penal sum of:

_____

$_____ .

lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for:

_____

_____

_____

_____

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full.

PAYMENT BOND

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns and other Subcontractors to whom Work under this Contract is sublet and his or their successors and assigns shall promptly pay or cause to be paid all lawful claims for:

a) Wages and compensation for labor performed and services rendered by all persons engaged in the prosecution of the Work under said Contract, and any amendment or extension thereof or addition thereto, whether such persons be agents, servants or employees of the Principal or of any such Subcontractors, including all persons so engaged who perform the work of laborers or mechanics at or in the vicinity of the site of the Project regardless of any Contractual relationship between the Principal or such Subcontractors, or his or their successors or assigns, on the one hand and such laborers or mechanics on the other, but not including office employees not regularly stationed at the site of the Project, and

b) Materials and supplies (whether incorporated in the permanent (construction or not), as well as teams, fuels, oils, implements or machinery furnished, used or consumed by said Principal or any Subcontractors at or in the vicinity of the site of the Project in the prosecution of the Work under said Contract and any amendment or extension thereof or addition thereto; then this obligation shall be null and void; otherwise to remain in full force and effect. This bond is subject to the following additional conditions, limitations and agreements:

c) The Principal and Surety (Sureties) agree that this bond shall be for the benefit of any materialman or laborer having a just claim, as well as the City itself.

d) All persons who have performed labor, rendered services or furnished materials and supplies, as aforesaid, shall have a direct right of action against the Principal and his, its or their successors and assigns, and the Surety (Sureties) herein, or against either or both or any of them and their successors and assigns. Such persons may sue in their own name, and may prosecute the suit to judgment and execution without the necessity of joining with any other person as party plaintiff.

e) The Principal and Surety (Sureties) agree that neither of them will hold the City liable for any judgment for costs or otherwise, obtained against either or both of them by a laborer or materialman in a suit brought by either a laborer or materialman under this bond for moneys allegedly due for performing work or furnishing material.

f) The Surety (Sureties) or its successors and assigns shall not be liable for any compensation recoverable by an employee or laborer under the Workmen's Compensation Law.

PAYMENT BOND

g) In no event shall the Surety (Sureties), or its successors or assigns, be liable for a greater sum than the penalty of this bond or be subject to any suit, action or proceeding hereon that is instituted by any person, firm, or corporation hereunder later than two years after the complete performance of said Contract and final settlement thereof.

The Principal, for himself/herself and his successors and assigns, and the Surety (Sureties), for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the City to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either of them might interpose to an action brought hereon by any person, firm or corporation, including Subcontractors, MATERIALMAN and third persons, for work, labor, services, supplies or material performed, rendered, or furnished as aforesaid upon the ground that there is no law authorizing the City to require the foregoing provisions to be placed in this bond.

And the Surety (Sureties) for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or of the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any part thereof, or of any Work to be performed, or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, Subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

PAYMENT BOND

IN WITNESS WHEREOF, the Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this_____day of_____,_____.

(SEAL) _____(L.S.)
Principal
By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

BOND PREMIUM RATE: _____

BOND PREMIUM COST: _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners. If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact. There should be executed an appropriate member of counterparts of the bond corresponding to the number of counterparts of the Contract.

PAYMENT BOND

ACKNOWLEDGMENT OF PRINCIPAL - IF A CORPORATION

State of_____County of _____ss:

On this _____ day of _____, _____

before me personally came _____

to me known, who, affirms or being by me duly sworn did depose and say that he/she resides

at_____

_____

that he/she is the _____ of _____
the corporation described in and which executed the foregoing instrument; that he/she knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he/she signed his name thereto by like order.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL - IF A PARTNERSHIP

State of_____ County of _____ss.:

On this _____day of _____,_____

before me personally appeared _____

to me known and known to me to be one of the members of the firm

of: _____
described in and who executed the foregoing instrument and he/she acknowledged to me that he/she executed the same as and for the act and deed of said firm.

_____
Notary Public or Commissioner of Deeds

PAYMENT BOND

ACKNOWLEDGMENT OF PRINCIPAL - IF AN INDIVIDUAL

State of_____ County of _____SS.:

On this _____ day of _____ , _____

before me personally appeared _____ me known and known to me to be the

person described in and who executed the foregoing instrument and acknowledged that he/she executed

the same.

_____
Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by:

a) appropriate acknowledgments of the respective parties;

b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety;

c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued; and

d) duly certified copy of latest published financial statement of assets and liabilities of Surety.

****

AFFIX ACKNOWLEDGMENTS AND JUSTIFICATIONS OF SURETIES

SCHOHARIE COUNTY

SCHEDULE OF PREVAILING WAGES

Note: The Contractor and its subcontractors shall pay the applicable and lawful prevailing wages and supplements to workers at the time work is performed. Changes in wage rates and supplements resulting from changes to the applicable and lawful prevailing wage schedules shall not be the basis for a change in the contract price.

NO TEXT FOR THIS PAGE

Note: The following is a listing of those trades expected to utilized on this project. If a Contractor proposes to use an alternative trade, he must notify the DEP Contract Compliance Office at 718-595-3211.

Contract: **CAT-475**

Description: High Level Outlet (HLO) Installation at Gilboa Dam and Crest Gate Removal

SCHEDULE OF WORKMEN, MECHANICS AND LABORERS

BRICKLAYER
BRICKLAYER FOREMAN
CARPENTER
CARPENTER APPRENTICE
CARPENTER FOREMAN
CEMEMENT MASON
CORE DRILLER
DIVER
DIVER FOREMAN
DIVER TENDER
DOCKBUILDER – PILE DRIVER
DOCKBUILDER – PILE DRIVER FOREMAN
ELECTRICIAN
ELECTRICIAN APPRENTICE
ELECTRICIAN FOREMAN
ELEVATOR CONSTRUCTOR
GLAZIER
HAZARDOUS MATERIAL HANDLER
INSULATOR – HEAT & FROST
IRONWORKER – ORNAMENTAL
IRONWORKER – ORNAMENTAL FOREMAN
IRONWORKER – STRUCTURAL
IRONWORKER – STRUCTURAL APPRENTICE
IRONWORKER – STRUCTURAL FOREMAN
LABORER
LABORER FOREMAN
LINEMAN ELECTRICIAN
LINEMAN ELECTRICIAN – TELEDATA
MASON TENDER
METALLIC LATHER
METALLIC LATHER FOREMAN
MILLWRIGHT
MILLWRIGHT APPRENTICE
MILLWRIGHT FOREMAN
OPERATING MAINTENANCE ENGINEER – CRANES
OPERATING MAINTENANCE ENGINEER – GENERATORS
OPERATING MAINTENANCE ENGINEER – LIGHT EQUIPMENT

OPERATING MAINTENANCE ENGINEER – MECHANIC
OPERATING MAINTENANCE ENGINEER – MEDIUM EQUIPMENT
OPERATING MAINTENANCE ENGINEER – OILER
PAINTER
PAINTER FOREMAN
PLUMBER
PLUMBER APPRENTICE
PLUMBER FOREMAN
ROOFER
ROOFER FOREMAN
SHEETMETAL WORKER
SHEETMETAL WORKER FOREMAN
STEAMFITTER
STEAMFITTER FOREMAN
SURVEY – INSTRUMENT PERSON
SURVEY – PARTY CHIEF
SURVEY – RODPERSON
TILE LAYER -SETTER
TREE REMOVER
TRUCK DRIVER (TEAMSTER)
TUNNEL WORKER
TUNNEL WORKER FOREMAN
TEAMSTER – BUILDING / HEAVY & HIGHWAY
TEAMSTER – DELIVERY – BUILDING / HEAVY & HIGHWAY
WELDER

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.
Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.
Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.
Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

*Contractor Registry (LL 220-I):
Labor Law Section 220-i requires that contractors obtain a Contractor Registry certificate of registration prior to bidding on or commencing work on a public or private project subject to prevailing wage requirements. Subcontractors also are prohibited from commencing work on covered employment unless they have received a Contractor Registry certificate. Contractors are required to submit their Certificate of Registration with their bid materials. A public database is available online to confirm registration at data.ny.gov to confirm registration validity. For additional information on how to register and the requirements, visit https://dol.ny.gov/public-work-contractor-and-subcontractorregistry-
landing.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain and preserve accurate payroll records for at least six (6)years.

Electronic Certified Payroll (LL 220-J)
Effective December 31, 2025, all contractors and subcontractors who perform public work, or covered private work subject to the prevailing wage, will be required to submit certified payrolls electronically to the Bureau of Public Work and Prevailing Wage Enforcement. Additional information about the electronic certified payroll submission system will be made available on the Department's Website at https://dol.ny.gov/Electronic-Payroll

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. The specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. Please Note: Updates to the Wage Schedule shall be made on a quarterly basis.

All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Shift Work

If the timeline of the contract requires shift work be performed to meet deadlines, the BPWE will enforce the shift work rate as the required rate on the project whether or not shift work is specifically addressed in the contract.

Paid Prenatal Leave

Every employer shall be required to provide to its employees twenty hours of paid prenatal personal leave during any fifty-two week calendar period. Paid prenatal personal leave shall mean leave taken for the health care services received by an employee during their pregnancy or related to such pregnancy, including physical examinations, medical procedures, monitoring and testing, and discussions with a healthcare provider related to the pregnancy. Paid prenatal personal leave may be taken in hourly increments. Benefits for paid prenatal personal leave shall be paid in hourly installments. Employees shall receive compensation at the employee's regular rate of pay, or the applicable minimum wage established by the labor law, whichever is greater, for the use of Paid Prenatal leave.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12226

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332

Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Schoharie County General Construction

Boilermaker — 07/01/2026

JOB DESCRIPTION Boilermaker **DISTRICT** 1

ENTIRE COUNTIES
Albany, Broome, Chenango, Columbia, Delaware, Essex, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

WAGES
Per hour

	07/01/2026	01/01/2027 Additional
Boilermaker	$ 45.84	$ 2.50*

*To be allocated at a later date

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 26.51 + $1.49*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the day observed by the State or Nation shall be observed, and when Christmas Day and New Year's fall on Saturday, Friday will be observed as the holiday.

REGISTERED APPRENTICES
(1/2) year terms at the following percentage of Journeyworker's wage per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th
65%	65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 19.71 +1.49*	$ 19.71 +1.49*	$ 20.69 +1.49*	$ 21.64 +1.49*	$ 22.62 +1.49*	$ 23.60 +1.49*	$ 24.57 +1.49*	$ 25.53 +1.49*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

1-197

Broadband — 07/01/2026

JOB DESCRIPTION Broadband **DISTRICT** 4

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: Only in the Village of Greenwood Lake, Village of Highland Falls, Town of Tuxedo, and Town of Patterson

WAGES
NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to New York State Labor Law §224-E, solicited on or after July 1,2025. For all other projects solicited prior to July 1,2025 please see LINEMAN ELECTRICIAN(1)-TELEDATA

Per Hour:	07/01/2026	08/04/2026
Field Tech Install/Repair*	$ 52.85	$ 54.44

For outside work (excluding installation on building construction/alteration/renovation projects), stopping at first point of attachment (demarcation), installing/maintaining/repairing broadband internet service.

"Broadband", "Broadband Service", or "Broadband Internet" means mass-market retail service by wire or radio that provides the capability to transmit data to and receive data from all or substantially all internet endpoints, including any capabilities that are incidental to and enable the operation of the communications service, but excluding dial-up internet access service.

*NOTE: EXCLUDES work within ten(10) feet of High Voltage (600 Volts and over) transmission lines. Please see LINEMAN rates.
*NOTE: Does not include the operation of equipment. Please see applicable OPERATING ENGINEER rates.
*NOTE: Does not include Groundmen/Flagger/Flagmen. Please see LABORER/LABORER-HEAVY/HIGHWAY rates.

SUPPLEMENTAL BENEFITS
Per Hour:

$ 23.24

OVERTIME PAY
See (B, K, *R) on OVERTIME PAGE
* Two and one half times the hourly rate after the 8th hour

HOLIDAY
Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

4-CWA-Dist2

Carpenter - Building 07/01/2026

JOB DESCRIPTION Carpenter - Building **DISTRICT** 2

ENTIRE COUNTIES
Albany, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Carpenter	$ 42.88	$ 4.00*	$ 3.00*
Floor Coverer	42.88	4.00*	3.00*
Carpet Layer	42.88	4.00*	3.00*
Dry-Wall	42.88	4.00*	3.00*
Diver-Wet Day	67.88	4.00*	3.00*
Diver-Dry Day	43.88	4.00*	3.00*
Diver Tender	43.88	4.00*	3.00*

*To be allocated at a later date

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Drivers/Dock Builders shall receive $0.25 per hour over the journeyworker's rate of pay when performing piledriving/dock building work.
- Certified welders shall receive $3.00 per hour over the journeyworker's rate of pay when the employee is required to be certified and performs AWS, DOT or ABS specified welding work
- When an employee performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require employees to be furnished and use or wear required forms of personal protection, then the employee shall receive their regular hourly rate plus $1.50 per hour.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  0' to 80' no additional fee
  81' to 100' additional $.50 per foot
  101' to 150' additional $0.75 per foot
  151' and deeper additional $1.25 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  0' to 50' no additional fee
  51' to 100' additional $.75 per foot
  101' and deeper additional $1.00 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK
On Agency/Owner mandated shift work, the following rates will be applicable:
1st Shift - Regular Rate
2nd Shift - Premium of 10% of base wage per hour
3rd Shift - Premium of 15% of base wage per hour
Shift work shall be defined as implementing at least two (2) shifts in a twenty-four (24) consecutive hour period. Shift work must be for a minimum of three (3) consecutive days.

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2026
Journeyworker	$ 25.34

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday which occurs on Sunday shall be observed the following Monday. If Christmas falls on a Saturday, it shall be observed on the prior Friday.

REGISTERED APPRENTICES
Wages per hour (1300 hour terms at the following percentage of Journeyworker's base wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$ 13.51	$ 13.51	$ 16.11	$ 16.11

NOTE ADDITIONAL AMOUNTS PAID TO APPRENTICES FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Driving/Dock Builder apprentices shall receive an additional $0.25 per hour worked when performing piledriving/dock building work.
- Certified Welders shall receive $3.00 per hour over the apprentices rate of pay when the apprentice is required to be certified and performs AWS, DOT or ABS specified welding work.
- When an apprentice performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require the apprentice to be furnished and use or wear required forms of personal protection, then the apprentice shall receive their regular hourly rate plus $1.50 per hour.

2-291B-Alb

Carpenter - Building / Heavy&Highway 07/01/2026

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing west to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour:	07/01/2026	07/01/2027 Additional
Carpenter - ONLY for Artificial Turf/Synthetic Sport Surface	$ 39.69	$ 2.25*

*To be allocated at a later date.

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyworker	$ 27.84

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE
Notes:
When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. Whan a holiday falls upon a Sunday, it shall be observed on the following Monday.
An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES
Wages per hour (1300 hour terms at the following percentage of Journeyworker's wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour worked:

$ 19.08	$ 19.69	$ 21.86	$ 22.47

2-42AtSS

Carpenter - Heavy&Highway 07/01/2026

JOB DESCRIPTION Carpenter - Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Albany, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES

Per hour	07/01/2026	07/01/2027 Additional
Carpenter	$ 48.77	$ 3.00*
Piledriver	48.77	3.00*
Diver-Wet Day	73.77	3.00*
Diver-Dry Day	49.77	3.00*
Diver-Tender	49.77	3.00*

*To be allocated at a later date

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

ADDITIONAL NOTES PERTAINING TO DIVERS/TENDERS:
- Divers and Tenders shall receive one and one half (1 1/2) times their regular diver and tender rate of pay for Effluent and Slurry diving.
- Divers and tenders being paid at the specified rate for Effluent and Slurry diving shall have all overtime rates based on the specified rate plus the appropriate overtime rates (one and one half or two times the specified rate for Slurry and Effluent divers and tenders).
- The pilot of an ADS or submersible will receive one and one-half (1 1/2) times the Diver-Wet Day Rate for time submerged.
- All crew members aboard a submersible shall receive the Diver-Wet Day rate.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  - 0' to 50' no additional fee
  - 51' to 100' additional $.50 per foot
  - 101' to 150' additional $0.75 per foot
  - 151' to 200' additional $1.25 per foot
  - 201' and deeper additional $1.50 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  - 0' to 50' no additional fee
  - 51' to 100' additional $.75 per foot
  - 101' to 200' additional $1.00 per foot
  - 201' and deeper additional $1.25 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK
When project owner mandates a single irregular work shift, the Journeyworkers and Apprentices will receive an additional $4.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 26.30

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- In the event a Holiday falls on a Saturday, the Friday before will be observed as a Holiday. If a Holiday falls on a Sunday, then Monday will be observed as a Holiday.
- The employee must work their scheduled workday before and their scheduled workday after the holiday to receive holiday pay.

REGISTERED APPRENTICES
CARPENTER/PILEDRIVER/DOCKBUILDER Apprentices
Wages per hour (1300 hour terms at the following percentage of journeyworker's base wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$ 18.93	$ 19.55	$ 21.66	$ 22.27

NOTE ADDITIONAL AMOUNTS PAID PER HOUR WORKED TO APPRENTICES FOR SPECIFIC TYPES OF WORK PERFORMED:
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

2-291HH-Alb

Electrician 07/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Fulton, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

PARTIAL COUNTIES
Greene: Portion of the County North of a line following the South limits of the City of Catskill in a westerly direction from the Hudson River to State Highway 23A. Then continuing on 23A to the road following the Little West Kill and continuing along this road to Delaware County.
Otsego: Only the Towns of Decatur and Worchester

WAGES
Per hour

	07/01/2026	06/01/2027 Additional
Electrician	$ 52.00	$ 3.85*
Audio/Sound	52.00	3.85*
Video	52.00	3.85*
Tele-Data	52.00	3.85*
Solar/ Photovoltaic	52.00	3.85*

*To be allocated at a later date.

Notes: An additional 5% above rate for work over 30' above floor and requires use of a safety harness when working on tooth picks, structural steel, temporary platforms, swing scaffolds & boatswain chairs. All OSHA approved lifts are excluded.
An additional 10% above rate on towers & smokestacks over 100' high.
An additional 20% above rate in shafts over 25' deep or tunnels over 50' long that are under construction.
An additional 5% above rate when Journeyworker's are required to work as Lead (Pb) cable splicers.
An additional 10% above rate when Journeyworker Welders are required to have ASME verification.

SHIFT WORK
When shift work or a single irregular shift of at least five (5) days duration is mandated by the job specifications or by the contracting agency, the following wage shall apply:

1st Shift	8:00 AM to 4:30 PM	Regular Wage
2nd Shift	4:30 PM to 1:00 AM	Regular Wage plus 17.3%
3rd Shift	12:30 AM to 9:00 AM	Regular Wage plus 31.4%

The Employer shall be permitted to adjust the starting hours of the shift by up to two (2) hours in order to meet the needs of the customer.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 32.85 plus 3% of wage

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE
* DOUBLE TIME AFTER 10 HOURS ON SATURDAY

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: If the holiday falls on Saturday, it shall be celebrated on Friday. If the holiday falls on Sunday, it shall be celebrated on Monday.

REGISTERED APPRENTICES
Terms at the following percentage of Journeyworker's wage per hour:

0-6mo	6-12mo	2nd yr	3rd yr	4th yr	5th yr
40%	45%	50%	60%	70%	80%

Notes: An additional 5% above rate for work over 30' above floor and requires use of a safety harness when working on tooth picks, structural steel, temporary platforms, swing scaffolds & boatswain chairs. All OSHA approved lifts are excluded.
An additional 10% above rate on towers & smoke stacks over 100' high.
An additional 20% above rate in shafts over 25' deep or tunnels over 50' long that are under construction.

Supplemental Benefits per hour worked:

0-12 month term	$ 16.32 plus 3% of wage
2nd year term	27.13 plus 3% of wage
3rd year term	28.27 plus 3% of wage
4th year term	29.42 plus 3% of wage
5th year term	30.56 plus 3% of wage

1-236

Elevator Constructor — 07/01/2026

JOB DESCRIPTION Elevator Constructor **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Essex, Fulton, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

PARTIAL COUNTIES
Madison: Madison Only the towns of: Brookfield, Hamilton, Lincoln, Madison, Smithfield, Stockbridge and the City of Oneida
Oneida: Entire county except the towns of: Camden, Florence, and Vienna.

WAGES
Per hour

	07/01/2026	01/01/2027
Mechanic	$ 60.25	$ 62.94
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 38.985*	$ 39.535*

*NOTE: Add 6% of regular hourly rate for all hours worked. Add 8% of regular hourly rate if more than 5 years of service.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE
Note: When a paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES per hour: 1 year terms at the following percentage of the Elevator Constructor Mechanic wage.

0-6 months	6-12 months	2nd year	3rd year	4th year
50%	55%	65%	70%	80%

SUPPLEMENTAL BENEFITS per hour:

0-6 months: 6% of the regular hourly apprentice rate paid, no additional supplemental benefits.

All other terms: Same as Journeyworker

1-35

Glazier — 07/01/2026

JOB DESCRIPTION Glazier **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES
Per hour

	07/01/2026	05/01/2027 Additional
Glazier Base Wage	$ 37.88 + 5.15*	$ 3.00**
High Work Base Wage***	$ 42.45 + 5.15*	$ 0.00**

(*) added to base wage for all hours whether straight or premium time
(**) To be allocated at a later date
(***) When working on Swing Stage or Lift 100 feet or more in height, measured from the ground level up.

SHIFT WORK

THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SHIFT WORK OR SINGLE IRREGULAR SHIFTS STARTING BETWEEN THE HOURS OF 4:00 PM to 6:30 AM:

Glazier Base Wage	$ 46.50
	+ 5.15*
High Work Base Wage	52.37
	+ 5.15*

(*)added to base wage for all hours whether straight or premium time

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 25.73
Journeyworker High Work	$ 31.52

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE
Premium is applied to the respective base wage only

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: If any of the holidays are designated by federal law to be celebrated on a day other than that on which they regularly fall, then the holiday shall be celebrated on the day set by said federal law as if the day on which the holiday is celebrated was actually the holiday date.

REGISTERED APPRENTICES
APPRENTICE WAGES per hour

Apprentice Glazier 1500 hr terms at the following percentage of Journeyworkers respective base wage.

1st	2nd	3rd	4th
50%	65%	75%	90%
+5.15*	+5.15*	+5.15*	+5.15*

(*)added to apprentice wage for all hours whether straight or premium time

APPRENTICE SUPPLEMENTAL BENEFITS per hour worked

Apprentice	
1st term	$ 21.29
2nd-4th term	25.73
Apprentice High Work	
1st term	25.24
2nd-4th term	31.52

Insulator - Heat & Frost — 07/01/2026

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Delaware, Essex, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Sullivan, Ulster, Warren, Washington

WAGES

Wages per hour	07/01/2026	05/01/2027 Additional
Asbestos Worker*	$ 43.02	$ 2.00**
Insulator*	43.02	2.00**
Firestopping Worker*	36.57	2.00**

(*) On Mechanical Systems only.
(**) To be allocated at a later date.

SHIFT WORK
On government mandated shift work additional 12% of wage for all shifts starting after 3:30 P.M.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 28.30

OVERTIME PAY
See (*B1, **Q) on OVERTIME PAGE
*B1=Double time begins after 10 hours on Saturday
**Q=Triple time on Labor Day if worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
When a holiday falls on Sunday the following Monday shall be observed as the holiday.

REGISTERED APPRENTICES
Wages per hour

One year terms at the following percentage of Journeyperson's wage.

1st	2nd	3rd	4th
60%	70%	80%	90%

Supplemental Benefits per hour worked:

Apprentices	$ 28.30

1-40

Ironworker 07/01/2026

JOB DESCRIPTION Ironworker **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Columbia, Delaware, Essex, Greene, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

PARTIAL COUNTIES
Fulton: Only the Townships of Broadalbin, Mayfield, Northampton, Bleecker and Johnstown.
Hamilton: Only the Townships of Hope, Benson and Wells.
Montgomery: Only the Townships of Florida, Amsterdam, Charleston, Glen, Mohawk and Root.
Otsego: Only the Towns of Unadilla, Butternuts, Morris, Otego, Oneonta, Laurens, Millford, Maryland and Worchester.

WAGES

Wages Per hour	07/01/2026
Ornamental	$ 42.25
Reinforcing	42.25
Rodman	42.25
Structural & Precast	42.25
Mover/Rigger	42.25
Fence Erector	42.25
Stone Derrickman	42.25
Sheeter	42.50
Curtain Wall Installer	42.25
Metal Window Installer	42.25

SHIFT WORK
Multiple shifts mandated by the project owner. All shifts will be eight (8) hours.

1st Shift	Regular wage rate	
2nd Shift	Regular wage rate plus 10%	- Starting times between 2 PM and 7 PM
3rd Shift	Regular wage rate plus 15%	- Starting times between 7 PM and 12 AM

NOTE: When a single irregular shift is worked, with start times based on second or third shifts, add 10% to the 1st shift wage rate posted above.

SUPPLEMENTAL BENEFITS
Per hour

JOURNEYWORKER	$ 36.67

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday which occurs on Sunday shall be observed the following Monday. Any holiday which occurs on Saturday shall be observed on the preceding Friday.

REGISTERED APPRENTICES
Wages per hour
ONE YEAR TERMS AT THE FOLLOWING WAGE RATES:

	07/01/2026
1st year	$ 23.50
2nd year	25.50
3rd year	27.50
4th year	29.50

Supplemental Benefits per hour worked	
1st year	$ 11.53
2nd year	23.79
3rd year	25.53
4th year	27.29

Laborer - Building — 07/01/2026

JOB DESCRIPTION Laborer - Building **DISTRICT** 1

ENTIRE COUNTIES
Schenectady, Schoharie

PARTIAL COUNTIES
Fulton: Only the Townships of Bleeker, Mayfield, Northampton, Johnstown,Broadalbin and Perth.
Montgomery: Only the Townships of Mohawk, Glen, Charleston, Amsterdam, and Florida.
Saratoga: Only the Townships of Day, Hadley, Edinburg, Corinth, Moreau,South Glens Falls, Providence, Greenfield, Wilton, Galway, Northumberland, Milton, Saratoga Springs, Charlton, Ballston, Malta and Clifton Park.

WAGES
Per hour

	07/01/2026	07/01/2027 Additional
Group #1: All Classifications except as noted in Groups 2 & 3	$ 41.57	$ 2.56*
Group #2: Blaster, Drilling equipment only where a separate air compressor unit supplies power, Metal formsetter (sidewalk), Well pointing & Laser operator	$ 42.07	$ 2.56*
Group #3: Handling of Asbestos or Toxic Materials	$ 42.92	$ 2.56*

(*)To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 25.95

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
All holidays shall be observed on the actual day of the week on which the holiday falls.

REGISTERED APPRENTICES
Wages per hour
1000 Hour terms at the following percentage of Journeyworker's basic hourly wage.

1st	2nd	3rd	4th
65%	75%	85%	95%

Supplemental Benefits per hour worked

Apprentices	$ 25.95

1-157

Laborer - Heavy&Highway **07/01/2026**

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 1

ENTIRE COUNTIES
Schenectady, Schoharie

PARTIAL COUNTIES
Fulton: Only the Townships of Bleeker, Mayfield, Northampton, Johnstown,Broadalbin and Perth.
Montgomery: Only the Townships of Mohawk, Glen, Charleston, Amsterdam, and Florida.
Saratoga: Only the Townships of Day, Hadley, Edinburg, Corinth, Moreau,South Glens Falls, Providence, Greenfield, Wilton, Galaway, Northumberland, Milton, Saratoga Springs, Charlton, Ballston, Malta and Clifton Park

WAGES
GROUP # A:
Flagman

GROUP # B:
General Laborer, Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Drill Helper, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steelmesh, Small Generators for Laborers, Tools Installation of Bridge Drainage Pipe, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Tail or Screw Operator on Asphalt Paver, Water Pump Operators(1-1/2" and Single Diaphragm) Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, Oil and Air Tool Operators, Wrecking Laborer, Outboard and Hand Boats.

GROUP # C:
Drilling Equipment Only Where a Separate Air Compressor Unit Supplies Power, Acetylene Torch Operators, Asphalt Paver/Raker and Powderman, Blasters, Metal Form Setters (sidewalk), Stone or Granite Curb Setters, assist in the unloading, distribution of all components of ground mounted solar system

GROUP # E:
Employees performing hazardous waste removal, lead abatement and removal, or asbestos abatement and removal on a State and/or Federally designated waste site & where relevant State or Federal regulations require employees to use or wear forms of personal protection.

WAGES per hour	07/01/2026	07/01/2027 Additional
Group # A	$ 44.19	$ 2.90*
Group # B	44.39	2.90*
Group # C	44.79	2.90*
Group # E	46.69	2.90*

(*)To be allocated at a later date.

SHIFT WORK
All employees who work a single irregular workday that starts from 5:00 pm to 1:00 am on a governmental mandated night work shall be paid an additional 15% of wage per hour.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 31.05

OVERTIME PAY
See (B, E, *Q) on OVERTIME PAGE
*Employees required to work a holiday which falls on a weekday (Mon-Fri) shall receive double time and double benefits plus holiday pay.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: If the holiday falls on Sunday, it will be celebrated on Monday. If the holiday falls on Saturday, it will be celebrated on Saturday. Employee must work the scheduled work day before and after the holiday to be eligible to receive holiday pay.

REGISTERED APPRENTICES
Wages per hour

1000 HOUR TERMS AT THE FOLLOWING PERCENTAGE OF JOURNEYWORKER'S BASE WAGE

1st	2nd	3rd	4th

65% 75% 85% 95%

Supplemental Benefits per hour worked

Apprentices $ 31.05

1-157h/h

Laborer - Tunnel 07/01/2026

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 1

ENTIRE COUNTIES
Albany, Fulton, Hamilton, Herkimer, Madison, Montgomery, Oneida, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

WAGES
Class 1: All support laborers/sandhogs working above the shaft or tunnel. All laborers/sandhogs working inside a 350 foot radius from the center of a shaft/portal performing site work.

Class 2: All laborers/sandhogs working in the shaft or tunnel

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel working outside a 350 foot radius from the center of a shaft/portal unless required to enter the shaft, access manhole or tunnel.

Per Hour

	07/01/2026
Class 1	$ 50.01
Class 2	52.01
Class 4	54.26
Class 5	46.26

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional $ 3.00 an hour.

SHIFT WORK
On all government mandated irregular shift work: 1.5 x the base rate Monday - Friday, Saturday is paid at 1.65 x the base wage, Sunday is paid at 2.15 x the base wage

SUPPLEMENTAL BENEFITS
Per hour:

Benefit 1	$ 31.79
Benefit 2	46.84
Benefit 3	61.89

Benefit 1 applies to straight time hours, paid holidays not worked.
Benefit 2 applies to over 8 hours in a day (M-F), irregular shift work hours worked, and Saturday hours worked.
Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and Location where the work is to be performed.

1-190/157T

Lineman Electrician 07/01/2026

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe, or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

Crane Operators: Operation of any type of crane on line projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on line projects.
Digging Machine Operator: All other digging equipment and augering on line projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

-----Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. Includes access matting for line work.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Technician	$ 64.37	$ 66.84	$ 69.47
Crane, Crawler Backhoe	64.37	66.84	69.47
Welder, Cable Splicer	64.37	66.84	69.47
Group B:			
Digging Mach. Operator	$ 57.93	$ 60.16	$ 62.52
Group C:			
Tractor Trailer Driver	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	51.50	53.47	55.58
Equipment Mechanic	51.50	53.47	55.58
Group D:			
Flagger	$ 35.40	$ 36.76	$ 38.21

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work." Includes access matting for line work.

Group A:			
Lineman, Technician	$ 64.37	$ 66.84	$ 69.47
Crane, Crawler Backhoe	64.37	66.84	69.47
Cable Splicer	70.81	73.52	76.42
Certified Welder, Pipe Type Cable	$ 67.59	$ 70.18	$ 72.94
Group B:			
Digging Mach. Operator	$ 57.93	$ 60.16	$ 62.52
Group C:			
Tractor Trailer Driver	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	51.50	53.47	55.58
Equipment Mechanic	51.50	53.47	55.58
Group D:			
Flagger	$ 35.40	$ 36.76	$ 38.12

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all railroad catenary installation and maintenance, third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. Includes access matting for line work.

Group A:			
Lineman, Tech, Welder	$ 65.81	$ 68.34	$ 71.03
Crane, Crawler Backhoe	65.81	68.34	71.03
Cable Splicer	72.39	75.17	78.13
Certified Welder, Pipe Type Cable	69.10	71.76	74.58
Group B:			
Digging Mach. Operator	$ 59.23	$ 61.51	$ 63.93
Group C:			
Tractor Trailer Driver	$ 55.94	$ 58.09	$ 60.38
Groundman, Truck Driver	52.65	54.67	56.82
Equipment Mechanic	52.65	54.67	56.82
Group D:			
Flagger	$ 36.20	$ 37.59	$ 39.07

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. Includes access matting for line work.

Group A:			
Lineman, Tech, Welder	$ 67.10	$ 69.68	$ 72.43
Crane, Crawler Backhoe	67.10	69.68	72.43
Group B:			
Digging Mach. Operator	$ 60.39	$ 62.71	$ 65.19
Group C:			
Tractor Trailer Driver	$ 57.04	$ 59.23	$ 61.57
Groundman, Truck Driver	53.68	55.74	57.94
Equipment Mechanic	53.68	55.74	57.94
Group D:			
Flagger	$ 36.91	$ 38.32	$ 39.84

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

SHIFT WORK

The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*
Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for all emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid	See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime	See (5, 6, 8, 15, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249a

Lineman Electrician - Teledata — 07/01/2026

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to LL 224-E,solicited prior to July 1, 2025. For all projects, excluding dial-up internet access service, solicited on or after July 1, 2025, please see BROADBAND

Per hour:	07/01/2026	01/04/2027	01/03/2028	01/01/2029
Cable Splicer	$ 42.03	$ 43.30	$ 44.59	$ 45.93
Installer, Repairman	39.89	41.09	42.32	43.59
Teledata Lineman	39.89	41.09	42.32	43.59
Tech., Equip. Operator	39.89	41.09	42.32	43.59
Groundman/Flagger	21.14	21.78	22.43	23.10

For outside work, stopping at first point of attachment (demarcation).

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work, please see LINEMAN.

SHIFT WORK
The following rates apply when the contracting agency mandates multiple shifts of at least five (5) days duration are worked. When two (2) or three (3) shifts are worked the following rates apply:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 6.18 plus 4%*	$ 6.43 plus 5%*	$ 6.43 plus 6%*	$ 6.68 plus 7%*

*NOTE: The percentage (%) listed above is based on the hourly wage paid, straight time rate or premium time rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting — 07/01/2026

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

Crane Operators: Operation of any type of crane on Traffic Signal/Lighting projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on Traffic Signal/Lighting projects.
Digging Machine Operator: All other digging equipment and augering on Traffic Signal/Lighting projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Technician	$ 55.31	$ 57.40	$ 59.64
Crane, Crawler Backhoe	55.31	57.40	59.64
Certified Welder	58.08	60.27	62.62
Group B:			
Digging Machine	$ 49.78	$ 51.66	$ 53.68
Group C:			
Tractor Trailer Driver	$ 47.01	$ 48.79	$ 50.69
Groundman, Truck Driver	44.25	45.92	47.71
Equipment Mechanic	44.25	45.92	47.71
Group D:			
Flagger	$ 33.19	$ 34.44	$ 35.78

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

SHIFT WORK
The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM TO 4:30 PM	REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM	REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM	REGULAR RATE PLUS 31.4%

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*
Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE.

NOTE: Double time for all emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249a-LT

Lineman Electrician - Tree Trimmer — 07/01/2026

JOB DESCRIPTION Lineman Electrician - Tree Trimmer **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also includes stump removal near underground energized electrical lines including telephone and CATV lines.

Per hour:	07/01/2026	01/01/2027	01/03/2027
Tree Trimmer	$ 34.67	$ 34.67	$ 36.23
Equipment Operator	30.67	30.67	32.05
Equipment Mechanic	30.67	30.67	32.05
Truck Driver	24.93	24.93	26.05
Groundman	20.53	20.53	21.45
Flagger	16.20	16.20*	16.93

* This rate may be subject to a minimum wage increase 01/01/2027.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 11.23*	$ 11.48*	$ 11.48*

*NOTE: Plus 4.5% of the hourly wage paid. The 4.5% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday. All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building — 07/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 12

ENTIRE COUNTIES
Albany, Columbia, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

PARTIAL COUNTIES
Warren: Only the Townships of Bolton, Lake George, Lake Luzerne,Queensbury, Stony Creek, Thurman & Warrensburg.

WAGES

Per hour	07/01/2026
Bricklayer	$ 43.92
Cement Mason(Bldg)	43.92
Plasterer/Fireproofing*	43.92
Pointer/Caulker/Cleaner	43.92
Stone Mason	43.92
Acid Brick	43.92

(*)Fireproofing of Structural only.

SUPPLEMENTAL BENEFITS
Per hour worked

Journeyworker	$ 24.58

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour

750 hour terms at the following percentage of Journey's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
60%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

All Terms	$ 24.58

12-2b.1

Mason - Building — 07/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 12

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES

Per hour	07/01/2026
Tile/Marble/Terrazzo:	
Setter	$ 38.31
Finisher	29.86

SUPPLEMENTAL BENEFITS
Per hour worked

Journeyworker Setter	$ 21.83
Journeyworker Finisher	18.87

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hourly Terms at the following percentage of Journeyworker's wage:

APPRENTICES INDENTURED PRIOR TO 07/01/2024:

Tile Setter:		Tile Finisher:	
1st term 0-500 hrs	60%	1st term 0-500 hrs	70%
2nd term 501-1500 hrs	70%	2nd term 501-1500 hrs	80%
3rd term 1501-2500 hrs	80%	3rd term 1501-2500 hrs	90%
4th term 2501-3500 hrs	85%	4th term 2501-3700 hrs	95%
5th term 3501-4500 hrs	90%		
6th term 4501-6000 hrs	95%		

APPRENTICES INDENTURED ON OR AFTER 07/01/2024:

Tile Setter:		Tile Finisher:	
1st term 0-1000 hrs	70%	1st term 0-1000 hrs	80%
2nd term 1001-2000 hrs	75%	2nd term 1001-2000 hrs	85%
3rd term 2001-3000 hrs	80%	3rd term 2001-3000 hrs	90%
4th term 3001-4000 hrs	85%	4th term 3001-3700 hrs	95%
5th term 4001-5000 hrs	90%		
6th term 5001-6000 hrs	95%		

Supplemental Benefits per hour worked:

Tile Setter:		Tile Finisher:	
1st Term	$ 12.98	1st Term	$ 12.22
2nd & 3rd Term	17.41	2nd & 3rd Term	15.55
4th & 5th term	19.62	4th Term	17.21
6th term	21.83		

12-2TS.1

Mason - Heavy&Highway — 07/01/2026

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 12

ENTIRE COUNTIES
Albany, Cayuga, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Madison, Montgomery, Oneida, Oswego, Rensselaer, Saratoga, Schenectady, Schoharie, St. Lawrence, Warren, Washington

PARTIAL COUNTIES
Onondaga: For Heavy & Highway Cement Mason or Plaster Work in Onondaga County, refer to Mason-Heavy&Highway tag 12-2h/h on.

WAGES
Per hour

	07/01/2026
Mason & Bricklayer	$ 45.07

Additional $1.00 per hour for work on any swing scaffold or staging suspended by means of ropes or cables.

SUPPLEMENTAL BENEFITS
Per hour worked

Journeyworker $ 23.43

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour

750 HR TERMS at the following percent of Journeyworker's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
60%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

0 to 500 Hours	$ 14.53
All Other Terms	23.43

12-2hh.1

Millwright 07/01/2026

JOB DESCRIPTION Millwright **DISTRICT** 2

ENTIRE COUNTIES
Albany, Chenango, Delaware, Fulton, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie

WAGES

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Building	$ 44.00	$ 3.50*	$ 3.50*
Heavy & Highway	47.50	3.50*	3.50*

*To be allocated at a later date.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive $1.75 per hour in addition to the current Millwrights rate provided he/she is directed to weld.
- For Building work if a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) are required, then that employee shall receive a $1.50 premium per hour for Building work.
- For Heavy & Highway work if the work is performed at a State or Federally designated hazardous waste site where employees are required to wear protective gear, the employees performing the work shall receive an additional $2.00 per hour over the millwright heavy and highway wage rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive $2.00 per hour in addition to the current Millwrights rate. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $1.00.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 28.25

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES
Wages per hour:

(1)year terms at the following percentage of Journeyworker's rate.

1st	2nd	3rd	4th
65%	75%	80%	90%

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive $1.75 per hour in addition to the current Millwrights rate provided he/she is directed to weld.
- For Building work if a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) are required, then that employee shall receive a $1.50 premium per hour for Building work.
- For Heavy & Highway work if the work is performed at a State or Federally designated hazardous waste site where employees are required to wear protective gear, the employees performing the work shall receive an additional $2.00 per hour over the millwright heavy and highway wage rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive $2.00 per hour in addition to the current Millwrights rate. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $1.00.

SUPPLEMENTAL BENEFITS per hour:

Apprentices:	
1st term	$ 11.96
2nd term	23.36
3rd term	24.99
4th term	26.62

2-1163.1

Millwright 07/01/2026

JOB DESCRIPTION Millwright **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
THE FOLLOWING RATE APPLIES TO ANY GAS/STEAM TURBINE AND OR RELATED COMPONENT WORK, INCLUDING NEW INSTALLATIONS OR MAINTENANCE AND ANY/ALL WORK PERFORMED WITHIN THE PROPERTY LIMITS OF A NUCLEAR FACILITY.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Millwright - Power Generation	$ 50.00	$ 3.00*	$ 3.00*

* To be allocated at a later date.

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive an additional $ 1.75 per hour provided they are directed to weld.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive an additional $ 1.50 per hour.
- An employee performing the work of a machinist shall receive an additional $ 2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $ 1.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour paid:

Journeyworker	$ 28.45*

*NOTE: Subject to OT premium

OVERTIME PAY
See (B, E, E2, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of Journeyworker's wage:

Appr. 1st year	65%*
Appr. 2nd year	75%*
Appr. 3rd year	80%*
Appr. 4th year	90%*

*NOTE: Additional premium for the following work listed below:

Certified Welder	$ 1.75
Hazardous Waste Work	1.50
Machinist	2.00
Underground (500' and below)	1.00

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	$ 11.96
Appr. 2nd year	23.50
Appr. 3rd year	25.15
Appr. 4th year	26.80

6-1163Power

Operating Engineer - Building 07/01/2026

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

PARTIAL COUNTIES
Dutchess: Defined as north of the northern boundary line of City of Poughkeepsie then due east to Route 115 to Bedell Road then east along Bedell Road to VanWagner Road then north along VanWagner Road to Bower Road then east along Bower Road to Rte. 44 east to Route 343 then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to Connecticut.

WAGES
NOTE:
-- In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
-- If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class C

CLASS A1**: All cranes that require A NYS crane license, tower cranes***(including self erecting), hydraulic cranes, locomotive crane, piledriver, cableway, derricks, whirlies, dragline, boom trucks over 5 tons, cherry pickers, overhead cranes (gantry or saddle type), truck cranes

CLASS A:
Shovel, Excavators 18,001 lbs. and above(including rubber tire full swing), Gradalls, power road grader, all CMI equipment, front-end rubber tire loader, tractor-mounted drill (quarry master), mucking machine, concrete central mix plant, concrete pump, belcrete system, automated asphalt concrete plant, and tractor road paver, boom trucks 5 tons and under, maintenance engineer, self-contained crawler drill-hydraulic rock drill, Profiler/Milling machine.

CLASS B:
Excavators 18,000 lbs. and under, Backhoes (rubber tired backhoe/loader combination), bulldozer, pushcat, tractor, traxcavator, scraper, LeTourneau grader, form fine grader, self-propelled soil compactor (fill roller), asphalt roller, blacktop spreader, power brooms, sweepers, trenching machine, Barber Green loader, side booms, hydro hammer, concrete spreader, concrete finishing machine, one drum hoist, power hoisting (single drum), hoist two drum or more, three drum engine, power hoisting (two drum and over), two drum and swinging engine, three drum swinging engine, hod hoist, A-L frame winches, core and well drillers (one drum), post hole digger, model CHB Vibro-Tamp or similar machine, batch bin and plant operator, dinky locomotive, skid steer loader, track excavator 5/8 cubic yard or smaller, front end rubber tired loader under four cubic yards, vacum machine (mounted or towed).

CLASS C:
Fork lift, high lift, all terrain fork lift: or similar, oiler, fireman and heavy-duty greaser, boilers and steam generators, pump, vibrator, motor mixer, air compressor, dust collector, welding machine, well point, mechanical heater, generators, temporary light plants, electric submersible pumps 4" and over, murphy type diesel generator, conveyor, elevators, concrete mixer, beltcrete power pack (belcrete system), seeding, and mulching machines, pumps, rotating telehandler (that does not require NYS crane license).

WAGES per hour

	07/01/2026	07/01/2027	07/01/2028	07/01/2029
Building		Additional	Additional	Additional
Class A1**	$ 60.78	$ 4.25*	$ 4.35*	$ 4.33*
Class A	$ 57.78	3.75*	3.85*	4.33*
Class B	$ 56.76	3.75*	3.85*	4.33*
Class C	$ 53.86	3.75*	3.85*	4.33*

(*) To be allocated at a later date

Additional $2.50 per hr over B rate for Nuclear Leader work.
Additional $2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

(**)TONNAGE RATING PREMIUMS:
Note: Additional value subject to same premiums as shown for OT
All cranes 1000 tons and over, A1 rate plus $7.00
All cranes 800-999 tons, A1 rate plus $6.00
All cranes 600-799 tons, A1 rate plus $5.00
All cranes 400-599 tons, A1 rate plus $4.00
All cranes 200-399 tons, A1 rate plus $3.00
All cranes 111-199 tons, A1 rate plus $2.25
All cranes 110 tons and under, A1 rate only

(***)Tower Cranes - A1 rate plus $ 0.50 (no tonnage premiums apply)

- Cranes in Luffer Configuration - A1 rate plus $ 5.00
- Cranes with external ballast (Tray or Wagon) - A1 rate plus $ 5.00
- NOTE: These premiums are in addition to the tonnage premiums if over 400 tons.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 34.38

OVERTIME PAY
See (B, E, *Q) on OVERTIME PAGE
*If a designated holiday is worked, employee shall receive 8 hours of straight time pay in addition to the double time rate for all hours worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Sunday, it will be celebrated on Monday. If the holiday falls on Saturday, it will be celebrated on Friday.

REGISTERED APPRENTICES
Wages per hour

1000 hours terms at the following percentage of Journeyworker's wage Class B

1st	2nd	3rd	4th
60%	70%	80%	90%

Supplemental Benefits per hour worked

All terms	$ 29.70

1-158 Alb

Operating Engineer - Heavy&Highway — 07/01/2026

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 1

ENTIRE COUNTIES
Albany, Broome, Chenango, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

PARTIAL COUNTIES
Dutchess: Defined as north of the northern boundary line of City of Poughkeepsie then due east to Route 115 to Bedell Road then east along Bedell Road to VanWagner Road then north along VanWagner Road to Bower Road then east along Bower Road to Rte. 44 east to Route 343 then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to Connecticut.

WAGES
NOTE:
---In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
---If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class C.

CLASS A1**: All Cranes that require a NYS Crane License (Boom Truck, Cableway, Cherry Picker, Derrick, Dragline, Overhead Crane (Gantry or Straddle Type), Pile Driver, Tower Cranes (including self-erecting)***, Truck Crane).

CLASS A: Asphalt Curb Machine (self-propelled, slipform); Asphalt Paver; Automated Concrete Spreader (CMI type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Backhoe Excavator, Full Swing (CAT 212 or similar type); Back Filling Machine; Belt Placer (CMI type); Blacktop Plant (automated); Blacktop Roller; Bull Dozer being operated with active GPS; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled, slipform); Concrete Pump; Cranes - listed in A1 that do not require a NYS Crane License; Directional Boring/Drilling Machine; Dredge; Dual Drum Paver; Excavator (all purpose-hydraulic, Gradall or similar); Front End Loader (4 cu. yd. & over); Head Tower (Sauerman or equal); Hoist (two or three drum); Holland Loader; Jetting Plow; Maintenance Engineer; Mine Hoist; Mucking Machine or Mole; Pavement Breaker (SP Wirtgen; PB-4 and similar type); Profiler/Milling Machine (over 105 h.p.); Power Grader; Quad 9; Quarry Master (or equivalent); Rotating Telehandler; Scraper (including challenger type); Shovel; Side Boom; Slip Form Paver; Tractor Drawn Belt-Type Loader; Truck or Trailer Mounted Log Chipper (self-feeder); Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Backhoe (tractor mounted, rubber tired); Bituminous Recycler Machine; Bituminous Spreader and Mixer; Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Bridge Deck Finishing Machine; Brokk; Cage Hoist; Central Mix Plant (non-automated) and All Concrete Batching Plants; Concrete Paver (over 16'); Crawler Drill (self-contained); Crusher; Diesel Power Unit; Drill Rigs (truck or tractor mounted); Front End Loader (under 4 cu. yd.); Greaseman - Lubrication Engineer; HiPressure Boiler (15 lbs & over); Hoist (one drum); Hydro-Axe; Kolman Plant Loader & similar type loaders (if employer requires another man to clean the screen or to maintain the equipment, they shall be an Oiler); Locomotive; Material Handling Knuckle Boom; Mini Excavators (under 18,000 lbs.); Mixer (for stabilized base, self-propelled); Monorail Machine; Profiler/Milling Machine (105 h.p. and under); Plant Engineer; Prentice Loader; Pug Mill; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above subgrade, See Class A for Blacktop Roller); Sea Mule; Self-contained ride-on Rock Drill (excluding Air-Track type drill); Skidder; Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Vacuum Machine (mounted or towed); Vermeer Saws (ride-on, any size or type); Welder; Winch and Winch Cat; Work Boat Operator including L.C.M.'s.

NOTE: Effective 07/01/27 Prentice Loader will move to CLASS A.

CLASS C: "A" Frame Winch Hoist (On Truck); Aggregate Plant; Articulated Heavy Hauler; Asphalt or Concrete Grooving Machine (ride-on); Ballast Regulator (ride-on); Bituminous Heater (self-propelled); Boat (powered); Boiler (used in conjunction with production); Cement & Bin Operator; Compressors****; Concrete Pavement Spreader and Finisher; Concrete Paver or Mixer (16' & under); Concrete Saw (self-propelled); Conveyor; Deck Hand; Directional Boring/Drilling Machine Locator; Drill (Core); Drill (Well); Dust Collectors****; Electric Pump When Used in Conjunction with Well Point System; Farm Tractor with accessories; Fine Grade Machine; Fireman; Forklift; Form Tamper; Generators****; Grout Pump; Gunite Machine; Hammers (hydraulic self-propelled); Heaters****; Hydra-Spiker (ride-on); Hydraulic Pump (jacking system); Hydro-Blaster (water); Light Plants****; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Post Hole Digger (excluding hand-held); Post Driver; Power Broom (towed); Power Heaterman; Power Sweeper; Pumps****; Revinius Widener; Roller (subgrade & fill); Scarifier (ride-on); Shell Winder; Skid Steer Loader (Bobcat or similar) including all attachments; Span Saw (ride-on); Steam Cleaner; Tamper (ride-on); Tie Extractor (ride-on); Tie Handlers (ride-on); Tie Inserters (ride-on); Tie Spacers (ride-on); Tire Repair; Track Liner (ride-on); Tractor; Tractor (with towed accessories); Vacuum Machine (self-propelled); Vibratory Compactor; Vibro Tamp; Welding Machines****; Well Point.

****CLASS C NOTE: Considered Hands-Off (unmanned). Includes only operation and maintenance of the equipment.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional	07/01/2029 Additional
CLASS A1**	$ 63.56	$ 4.29*	$ 4.42*	$ 4.56*
CLASS A	59.81	3.54*	3.67*	3.81*
CLASS B	58.90	3.54*	3.67*	3.81*
CLASS C	56.33	3.54*	3.67*	3.81*

* To be allocated at a later date.

(**) TONNAGE PREMIUMS:
All cranes up to 64 ton capacity - A1 rate
All cranes 65 ton to 110 ton capacity - A1 rate plus $ 1.50
All cranes 111 ton to 199 ton capacity- A1 rate plus $ 2.00
All cranes 200 ton to 399 ton capacity - A1 rate plus $ 3.00
All cranes 400 ton to 599 ton capacity - A1 rate plus $ 4.00
All cranes 600 ton to 799 ton capacity - A1 rate plus $ 5.00
All cranes 800 ton to 999 ton capacity - A1 rate plus $ 6.00
All cranes 1000 ton capacity and over - A1 rate plus $ 7.00

(***) Tower Cranes - A1 rate plus $ 3.00 (no tonnage premiums apply)

- Cranes in Luffer Configuration - A1 rate plus $ 5.00
- Cranes with external ballast (Tray or Wagon) - A1 rate plus $ 5.00

Additional $ 2.50 per hour for hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SHIFT WORK
SINGLE IRREGULAR WORK SHIFT: Additional $ 2.50 per hour for all employees who work a single irregular work shift starting from 5:00 PM to 1:00 AM that is mandated by the Contracting Agency.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 34.60

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

NOTE: If a holiday falls on Sunday, it will be celebrated on Monday. If an employee works on this Monday, they shall be compensated at double time plus the holiday pay (triple time).

REGISTERED APPRENTICES
WAGES per hour: Hourly terms at the following percentage of Journeyworker's CLASS B wage.

0-1000 hrs	60%
1001-2000 hrs	70%
2001-3000 hrs	80%
3001-4100 hrs	90%

An additional $ 2.50 per hour is required when an apprentice performs hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SUPPLEMENTAL BENEFITS per hour:

All Terms	$29.20

1-158H/H Alb

Operating Engineer - Survey Crew 07/01/2026

JOB DESCRIPTION Operating Engineer - Survey Crew **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

WAGES
These rates apply to Building, Tunnel, and Heavy Highway.

Per hour:
SURVEY CLASSIFICATIONS:
Party Chief - One who directs a survey party.
Surveyor - One who operates the surveying instruments.
Survey Assistant - One who holds the instruments and assists the Instrument Person.

	07/01/2026
Party Chief	$ 56.64
Surveyor	52.74
Surveyor Assistant	36.00

Additional $3.00/hr. for Tunnel Work.
Additional $2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS
Per hour worked:

Party Chief	$ 32.45
Surveyor	$ 32.45
Survey Assistant	$ 20.60

OVERTIME PAY
See (B, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on percentage of Surveyor wage:

07/01/2026		
0-1000	1001-2000	2001-3000
60%	70%	80%

SUPPLEMENTAL BENEFIT per hour worked:

All Terms:	$ 22.65

12-158-545 D.H.H.

Operating Engineer - Survey Crew - Consulting Engineer 07/01/2026

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

WAGES
These rates apply to feasibility and preliminary design surveying, line and grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:
SURVEY CLASSIFICATIONS:
Party Chief - One who directs a survey party.
Surveyor - One who operates the surveying instruments.
Survey Assistant - One who holds the instruments and assists the Instrument Person.

	07/01/2026
Party Chief	$ 56.64
Surveyor	52.74
Survey Assistant	36.00

Additional $3.00/hr. for Tunnel Work.
Additional $2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS
Per hour worked:

Party Chief	$ 32.45
Surveyor	$ 32.45
Survey Assistant	$ 20.60

OVERTIME PAY
See (B, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on percentage of Surveyor wage:

07/01/2026		
0-1000	1001-2000	2001-3000
60%	70%	80%

SUPPLEMENTAL BENEFIT per hour worked:
All Terms: $22.65

12-158-545 DCE

Operating Engineer - Tunnel — 07/01/2026

JOB DESCRIPTION Operating Engineer - Tunnel **DISTRICT** 7

ENTIRE COUNTIES
Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES
Dutchess: Northern part of Dutchess, to the northern boundary line of the City of Poughkeepsie, then due east to Route 115 to Bedell Road, then east along Bedell Road to VanWagner Road, then north along VanWagner Road to Bower Road, then east along Bower Road to Rte. 44 east to Rte. 343, then along Rte. 343 east to the northern boundary of the Town of Dover Plains and east along the northern boundary of the Town of Dover Plains, to the borderline of the State of Connecticut.
Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98 and the entirety of the City of Batavia.

WAGES
CLASS A: Automatic Concrete Spreader (CMI Type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Belt Placer (CMI Type); Blacktop Plant (automated); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled slipform); Concrete Pump (8" or over); Dredge; Dual Drum Paver; Excavator; Front End Loader (4 cu. yd & over); Gradall; Head Tower (Sauerman or Equal); Hoist (shaft); Hoist (two or three Drum); Log Chipper/Loader (self-feeder); Maintenance Engineer (shaft and tunnel); any Mechanical Shaft Drill; Mine Hoist; Mining Machine(Mole and similar types); Mucking Machine or Mole; Overhead Crane (Gantry or Straddle Type); Pile Driver; Power Grader; Remote Controlled Mole or Tunnel Machine; Scraper; Shovel; Side Boom; Slip Form Paver (If a second man is needed, they shall be an Oiler); Tripper/Maintenance Engineer (shaft & tunnel); Tractor Drawn Belt-Type Loader; Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Automated Central Mix Concrete Plant; Backhoe (track mounted, rubber tired); Backhoe (topside); Bituminous Spreader and Mixer, Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Cage Hoist; Central Mix Plant(non-automated); all Concrete Batching Plants; Compressors (4 or less exceeding 2,000 c.f.m. combined capacity); Concrete Pump; Crusher; Diesel Power Unit; Drill Rigs (tractor mounted); Front End Loader (under 4 cu. yd.); Grayco Epoxy Machine; Hoist (One Drum); Hoist (2 or 3 drum topside); Knuckle Boom material handler; Kolman Plant Loader & similar type Loaders (if employer requires another person to clean the screen or to maintain the equipment, they shall be an Oiler); L.C.M. Work Boat Operator; Locomotive; Maintenance Engineer (topside); Maintenance Grease Man; Mixer (for stabilized base-self-propelled); Monorail Machine; Plant Engineer; Personnel Hoist; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above sub-grade); Sea Mule; Shotcrete Machine; Shovel (topside); Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Tunnel Locomotive; Vacuum Machine (mounted or towed); Welder; Winch; Winch Cat.

CLASS C: A Frame Truck; All Terrain Telescoping Material Handler; Ballast Regulator (ride-on); Compressors (4 not to exceed 2,000 c.f.m. combined capacity; or 3 or less with more than 1200 c.f.m. but not to exceed 2,000 c.f.m.); Compressors (any size, but subject to other provisions for compressors); Dust Collectors; Generators; Pumps; Welding Machines; Light Plants (4 or any type combination); Concrete Pavement Spreaders and Finishers; Conveyor; Drill (core); Drill (well); Electric Pump used in conjunction with Well Point System; Farm Tractor with Accessories; Fine Grade Machine; Fork Lift; Grout Pump (over 5 cu. ft.); Gunite Machine; Hammers (hydraulic-self-propelled); Hydra-Spiker (ride-on); Hydra-Blaster (water); Hydro-Blaster; Motorized Form Carrier; Post Hole Digger and Post Driver; Power Sweeper; Roller grade & fill); Scarifier (ride-on); Span-Saw (ride-on); Submersible Electric Pump (when used in lieu of well points); Tamper (ride-on); Tie-Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on); Track Liner (ride-on); Tractor with towed accessories; Vibratory Compactor; Vibro Tamp, Well Point.

CLASS D: Aggregate Plant; Cement & Bin Operator; Compressors (3 or less not to exceed 1,200 c.f.m. combined capacity); Compressors (any size, but subject to other provisions for compressors); Dust Collectors; Generators; Pumps; Welding Machines; Light Plants (3 or less or any type or combination); Concrete Saw (self-propelled); Form Tamper; Greaseman; Hydraulic Pump (jacking system); Junior Engineer; Light Plants; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Power Broom (towed); Power Heaterman (when used for production); Revinius Widener; Shell Winder; Steam Cleaner; Tractor.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional	07/01/2029 Additional
CLASS A	$ 60.95	$ 3.54*	$ 3.67*	$ 3.81*
CLASS B	59.73	3.54*	3.67*	3.81*
CLASS C	56.94	3.54*	3.67*	3.81*
CLASS D	53.93	3.54*	3.67*	3.81*

* To be allocated at a later date.

Additional $5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection.

CRANES:
Crane 1: All Tower cranes, including self-erecting.
Crane 2: All Lattice Boom Cranes and all other cranes with a manufacturer's rating of fifty (50) ton and over.
Crane 3: All hydraulic cranes and derricks with a manufacturer's rating of forty nine (49) ton and below, including boom trucks.

Crane 1	$ 64.95
Crane 2	63.95
Crane 3	62.95

SUPPLEMENTAL BENEFITS

Per hour:

$ 26.05
+ 10.85*

* This portion of the benefits subject to SAME PREMIUM as shown for overtime wages.

OVERTIME PAY

See (B, B2, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES

WAGES per hour: Hourly terms at the following percentage of Journeyworker's CLASS B wage.

1st term: (0-1000 hrs) 60%
2nd term: (1001-2000 hrs) 65%
3rd term: (2001-3000 hrs) 70%
4th term: (3001-4100 hrs) 75%

Additional $5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection.

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker.

7-158-832TL.

Painter 07/01/2026

JOB DESCRIPTION Painter **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Essex, Franklin, Fulton, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES
Per hour

	07/01/2026	05/01/2027 Additional
Painter/Wallcovers	$ 34.30 plus 1.30*	$ 1.55**
Drywall Finishers	34.30 plus 1.30*	1.55**
Spray Rate	34.30 plus 1.30*	1.55**

(*)Added to Journeyworker wage for all hours straight or premium.
(**)To be allocated at a later date.

NOTE: Additional Premiums for the following work listed below:
- Additional $1.00 per hour for STRUCTURAL STEEL. Structural Steel is defined as any steel where a person is required to work without the support of solid scaffolding or mechanical lifts (excluding bridges). All employees working on objects with the use of swing stage, boatswain chair, pick and cables only will be paid the Structural Steel premium.
- Additional $1.00 per hour for LEAD ABATEMENT.

*****BRIDGE PAINTER*****
See Bridge Painter rates for the following work:
All Bridges and Tanks

SHIFT WORK
When multiple shifts or a singular irregular shift is required by the contracting agency or bid specification starting after 2:30 PM it shall be considered shift work. This work shall carry a job classification of $1.00 per hour over the applicable rate.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 21.35

OVERTIME PAY
See (B, E2, H) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: If the holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES per hour (hourly terms)

1st term (0-1000hrs)	$ 16.74 plus 4.09*
2nd term (1001-2000hrs)	$ 18.45 plus 4.09*
3rd term (2001-3000hrs)	$ 21.88 plus 2.50*
4th term (3001-4000hrs)	$ 25.31 plus 1.50*
5th term (4001-5000hrs)	$ 27.44 plus 1.30*
6th term (5001-6000hrs)	$ 30.87 plus 1.30*

(*)Added to Apprentice wage for all hours straight or premium

SUPPLEMENTAL BENEFITS per hour

1st & 2nd term	$ 17.26
3rd term	18.85
4th term	19.85
5th & 6th term	21.35

1-201-P

Painter - Bridge & Structural Steel 07/01/2026

JOB DESCRIPTION Painter - Bridge & Structural Steel **DISTRICT** 8

ENTIRE COUNTIES
Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per Hour:
STEEL:

Bridge Painting:	07/01/2026	10/01/2026
	$ 57.00*	Additional
	+ 12.90**	+ 3.64***

ADDITIONAL $7.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

*NOTE: All premium wages are to be calculated on base rate per hour only.

** For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (50 hour cap).

*** To be allocated a later date

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK
When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS
Per Hour:
Journeyworker:

$ 13.49
+ 31.67*

OVERTIME PAY
See (B, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wage - Per hour:
Apprentices: (1) year terms.

	07/01/2026
1st year	$ 22.80*
	+ 5.64**
2nd year	$ 34.20*
	+ 7.74**
3rd year	$ 45.60*
	+ 10.31**

*NOTE: All premium wages are to be calculated on base rate per hour only.

** For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (50 hour cap).

Supplemental Benefits - Per hour:

1st year	$ 13.74

2nd year	$ 8.09* + 18.99
3rd year	$ 10.79* + 25.34

*Portion not applicable to May 1st to November 15th and Nov 16th to April 30th period mentioned above.

8-DC-9/806/155-BrSS

Painter - Line Striping — 07/01/2026

JOB DESCRIPTION Painter - Line Striping **DISTRICT** 8

ENTIRE COUNTIES
Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per hour:

	07/01/2026	04/01/2027
Painter (Striping-Highway):		
Striping-Machine Operator*	$ 36.93	$ 38.45
Linerman Thermoplastic	44.44	46.22

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

SHIFT WORK
When directly specified in public agency or authority contract documents there shall be a 30% night shift premium pay differential for all work performed after 9:00pm and before 5:00am.

SUPPLEMENTAL BENEFITS
Per hour paid:
Journeyworker:

Striping Machine Operator:	$ 24.95	$ 25.60
Linerman Thermoplastic:	24.95	25.60

OVERTIME PAY
See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES
One (1) year terms at the following wage rates:

	07/01/2026
1st Term:	$ 21.18
2nd Term:	27.40
3rd Term:	33.30

Supplemental Benefits per hour:

1st term:	$ 18.06
2nd term:	22.14
3rd term:	25.59

8-1456-LS

Painter - Metal Polisher — 07/01/2026

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2026
Metal Polisher	$ 41.33
Metal Polisher*	42.43
Metal Polisher**	45.33

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker:

All classifications	$ 13.99

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year term at the following wage rates:

	07/01/2026
1st year	$ 20.67
2nd year	22.73
3rd year	24.80
1st year*	$ 21.06
2nd year*	23.17
3rd year*	25.34
1st year**	$ 23.17
2nd year**	25.23
3rd year**	27.30

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 9.19
2nd year	9.19
3rd year	9.19

8-8A/28A-MP

Plumber — 07/01/2026

JOB DESCRIPTION Plumber **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Schenectady, Schoharie

PARTIAL COUNTIES
Hamilton: Only the Towns of Arietta, Benson, Hope, Inlet, Lake Pleasant, Morehouse and Wells.
Saratoga: Only the Towns of Charlton, Clifton Park, Galway,Halfmoon, Milton, Stillwater and Waterford and the city of Mechanicville.

WAGES
Per hour:

	07/01/2026	05/01/2027
Plumber:		
Pipefitter, Steamfitter	$ 57.56	$ 59.96

SHIFT WORK
Shift work outside of normal working hours shall be paid at straight time plus 12% of the base rate per hour. Shift differentials apply when irregular shift work is mandated by the contracting agency.

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 30.33	$ 31.13

OVERTIME PAY
See (B1, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Whenever a Holiday falls on Saturday, the preceding day, Friday, shall be observed as the Holiday. If a Holiday falls on a Sunday, the following day, Monday shall be observed as the Holiday.

REGISTERED APPRENTICES
Wages per hour
One year terms at the following percentage of journeyperson's wage rate:

1st	2nd	3rd	4th	5th
45%	55%	65%	75%	90%

Supplemental Benefits per hour:

All Terms	$ 24.78	$ 25.48

1-7-SF

Roofer — 07/01/2026

JOB DESCRIPTION Roofer **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Chenango, Delaware, Otsego, Schoharie, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour:	07/01/2026	06/01/2027 Additional	06/01/2028 Additional
Roofer, Waterproofer	$ 31.79 + 1.06*	$ 3.50**	$ 4.00**

*This amount is paid for all hours worked, whether regular or premium hours.
**To be allocated at a later date.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:00 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off, torching, or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 24.99

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages:
Indentured prior to 06/01/2026:

Hours per term	
0-667 Hrs.	$ 22.25 + 0.74*
668-1334 Hrs.	23.84 + 0.79*
1335-2001 Hrs.	25.43 + 0.85*
2002-2668 Hrs.	27.02 + 0.90*
2669-3335 Hrs.	28.61 + 0.95*
3336-4000 Hrs.	30.20 + 1.01*

Indentured on or after 06/01/2026:

Hours per term	
0-600 Hrs.	$ 25.43 + 0.85*
601-1200 Hrs.	26.23 + 0.87*

1201-1800 Hrs.	27.02 + 0.90*
1801-2400 Hrs.	27.82 + 0.93*
2401-3000 Hrs.	28.61 + 0.95*
3001-3600 Hrs.	29.41 + 0.98*
3601-4200 Hrs.	30.20 + 1.01*
4201-4800 Hrs.	31.00 + 1.03*

*This amount is paid for all hours worked, whether regular or premium hours.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off, torching, or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

Supplemental Benefits:
Indentured prior to 06/01/2026:

Hours per term	
0-667 Hrs.	$ 20.93
668-1334 Hrs.	21.60
1335-2001 Hrs.	22.29
2002-2668 Hrs.	22.96
2669-3335 Hrs.	23.63
3336-4000 Hrs.	24.32

Indentured on or after 06/01/2026:

Hours per term	
0-600 Hrs.	$ 11.45
601-1200 Hrs.	11.45
1201-1800 Hrs.	19.50
1801-2400 Hrs.	23.30
2401-3000 Hrs.	23.63
3001-3600 Hrs.	23.97
3601-4200 Hrs.	24.32
4201-4800 Hrs.	24.65

2-203elmi

Sheetmetal Worker 07/01/2026

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 1

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES
Per hour

	07/01/2026	12/01/2026 Additional	06/01/2027 Additional	12/01/2027 Additional
Sheetmetal Worker	$ 43.68	$ 1.25*	$ 1.25*	$ 1.25*

(*)To be allocated at a later date

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 37.86

OVERTIME PAY
See (B, *E, E5, Q) on OVERTIME PAGE
*First 8 hours on Saturday only.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
When any holiday falls on Saturday, the Friday before such holiday shall be recognized as the legal holiday. Any holiday falling on Sunday, the following Monday shall be recognized as the legal holiday.

REGISTERED APPRENTICES
Wages per hour

6 Month Terms at the following rate:

1A term	$ 24.36
1B term	26.35
2A term	27.34
2B term	28.33
3A term	28.89
3B term	29.90
4A term	30.58
4B term	32.76
5A term	34.94
5B term	37.13

Supplemental Benefits per hour

1A term	$ 23.48
1B term	24.24
2A term	24.56
2B term	24.87
3A term	30.82
3B term	31.58
4A term	33.30
4B term	34.08
5A term	34.85
5B term	35.62

Sprinkler Fitter — 07/01/2026

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES
Per hour

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
Sprinkler Fitter	$ 47.91	$ 47.91	$ 50.76	$ 50.76

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 30.71	$ 31.71	$ 31.71	$ 32.71

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
One Half Year terms at the following wage per hour:

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
1st Term	$ 24.50	$ 24.50	$ 25.73	$ 25.73
2nd Term	27.35	27.35	28.72	28.72
3rd Term	29.63	29.63	31.11	31.11
4th Term	31.91	31.91	33.50	33.50
5th Term	33.62	33.62	35.30	35.30
6th Term	36.47	36.47	38.29	38.29
7th Term	38.75	38.75	40.68	40.68
8th Term	41.03	41.03	43.08	43.08
9th Term	43.30	43.30	45.47	45.47
10th Term	45.58	45.58	47.86	47.86

Supplemental Benefits per hour:				
1st & 2nd Term	$ 10.23	$ 11.23	$ 11.23	$ 12.23
3rd & 4th Term	22.79	23.79	23.79	24.79
All Other Terms	23.04	24.04	24.04	25.04

1-669

Teamster - Building 07/01/2026

JOB DESCRIPTION Teamster - Building **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

PARTIAL COUNTIES
Warren: Only the Townships of Bolton, Warrensburg, Thurman,Stony Creek, Lake George, Lake Luzerne and Queensbury.

WAGES
GROUP # A:
Straight trucks, winch, transit mix on the site, road oilers,
dump trucks, pick-ups, panel, water trucks, fuel trucks on the site
(including nozzle).

GROUP # B:
Low boy or Low boy trailer, Euclids or similar equipment.

WAGES per hour

	07/01/2026
Group A	$ 33.65
Group B	33.95

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 30.56

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday which occurs on Sunday shall be observed the following Monday.

1-294

Teamster - Heavy&Highway 07/01/2026

JOB DESCRIPTION Teamster - Heavy&Highway **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Fulton, Greene, Hamilton, Herkimer, Montgomery, Oneida, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

PARTIAL COUNTIES
Chenango: Entire county except the Townships of Afton, Bainbridge, Coventry, Greene, Guilford, Oxford and Smithville.
Lewis: Only the Township of Grieg, Lewis, Leyden, Lowville, Lyonsdale, Martinsburg, Turin, West Turin and Watson.
Madison: Only the Townships of Brookfield, Eaton, Hamilton, Lebanon, Lincoln, Madison, Smithfield, Stockbridge and the City of Oneida
Otsego: Entire county EXCEPT Townships of Butternuts, Laurens, Maryland, Milford, Morris, Oneonta, Otego, Unidilla and Worchester.
Warren: Only the Townships of Bolton, Warrensburg, Thurman, Stony Creek, Luzerne, Caldwell (Lake George), and Queensbury.

WAGES
GROUP #1:
Warehousemen, Yardmen, Truck Helpers, Pickups, Panel Trucks, Flatboy Material Trucks(straight jobs), Single Axel Dump Trucks, Dumpsters, Material Checkers and Receivers, Greasers, Truck Tiremen, Mechanics Helpers and Parts Chasers.

GROUP #2:
Tandems and Batch Trucks, Mechanics, Dispatcher.

GROUP #3:
Semi-Trailers, Low-boy Trucks, Asphalt Distributor Trucks, and Agitator, Mixer Trucks and dumpcrete type vehicles, Truck Mechanic, Fuel Trucks.

GROUP #4:
Specialized Earth Moving Equipment, Euclid type, or similar off-highway, where not self-loading, Straddle (Ross) Carrier, and self-contained concrete mobile truck.

GROUP #5:
Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not self-loading.

Note: Water Tank, Sprinkler Truck and Winch Trucks shall be governed by the appropriate group according to axle (i.e single axle, three axle, Euclid or semi).

WAGES per hour	07/01/2026	07/01/2027
Group #1	$ 43.79	$45.79
Group #2	43.85	45.85
Group #3	43.94	45.95
Group #4	44.09	46.10
Group #5	44.26	46.28

NOTE: Additional $1.00 per hour for Hazardous waste projects that require a Level C or greater protection.

SHIFT WORK
All employees who work a single irregular work shift starting between 5pm and 1 am on governmental mandated night shifts shall be paid an additional $2.50 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

$ 30.77	$ 31.64
+ 1.00*	+ 1.00*

(*)This portion of the supplemental benefit is not applicable to paid holidays, only payable on all hours worked.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
If a holiday falls on Sunday, it will be celebrated on Monday. If a holiday falls on Saturday, it will be celebrated Saturday. An employee must work the scheduled working day before and after a holiday to receive holiday pay.

1-294h/h

Welder 07/01/2026

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2026

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Schoharie County Residential

Laborer - Residential — 07/01/2026

JOB DESCRIPTION Laborer - Residential **DISTRICT** 1

ENTIRE COUNTIES
Schenectady, Schoharie

PARTIAL COUNTIES
Fulton: Only the Townships of Bleeker, Mayfield, Northampton, Johnstown,Broadalbin and Perth.
Montgomery: Only the Townships of Mohawk, Glen, Charleston, Amsterdam,and Florida.
Saratoga: Only the Townships of Day, Hadley, Edinburg, Corinth, Moreau,South Glens Falls, Providence, Greenfield, Wilton, Galaway, Northumberland, Milton, Saratoga Springs, Charlton, Ballston, Malta and Clifton Park

WAGES
IMPORTANT NOTE: This shall apply to all rehabilitation work on residential structures. "Rehabilitation" shall be defined to include all work, including demolition, repair and alteration on any existing structure which is intended for residential use. On new housing, shall be applicable only to site construction of all new work done by the Employer on one (1) family, two (2) family, row housing and garden type homes or apartments which are not more than four (4) stories above ground level and are used as dwellings.

Per hour

	07/01/2026
Laborer	$ 31.18

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 25.95

OVERTIME PAY
See (B, E2, *H) on OVERTIME PAGE
*Double Time on Labor Day

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
All holidays shall be observed on the actual day of the week on which the holiday falls.

REGISTERED APPRENTICES
Wages per hour

1000 Hour terms at the following percentage of Journeyworkers's wage

1st	2nd	3rd	4th
65%	75%	85%	95%

Supplemental Benefits per hour worked

Apprentices	$ 25.95

1-157r

Mason - Residential — 07/01/2026

JOB DESCRIPTION Mason - Residential **DISTRICT** 12

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES
IMPORTANT NOTE: Applies to all rehabilitation work on residential structures. "Rehabilitation" shall be defined to include all work, including demolition, repair and alteration on any existing structure which is intended for residential use. On new housing, this article shall be applicable only to site construction of all new work done by the Employer on one (1) family, two (2) family, row housing and garden type homes or apartments which are not more than four (4) stories above ground level and are used as dwellings.

Per hour

	07/01/2026
Bricklayer	$ 26.79
Cement Mason	26.79
Plasterer	26.79
Point/Caulk/Clean	26.79
Acid Brick	26.79

SUPPLEMENTAL BENEFITS
Per hour worked

Journeyworker	$ 12.42

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

12-2r.z1

Mason - Tile Setter & Finisher - Residential — 07/01/2026

JOB DESCRIPTION Mason - Tile Setter & Finisher - Residential **DISTRICT** 12

ENTIRE COUNTIES
Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

WAGES
IMPORTANT NOTE: Applies to the construction of one family, two family row housing, townhouses, apartments, condominiums and garden type projects or a combination thereof, together with related service buildings and facilities which construction work may be performed wholly on-site or may consist of the assembly of off-site produced modules or components but any of which living units are in the finished form no more than two (2) stories high and are to be utilized solely as dwellings.

Per hour	07/01/2026
Tile/Marble/Terrazzo	
Setter	$ 24.34
Finisher	19.50

SUPPLEMENTAL BENEFITS
Per hour worked

Journeyworker Setter	$ 8.15
Journeyworker Finisher	8.03

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

12-2TSFr

Sprinkler Fitter - Residential — 07/01/2026

JOB DESCRIPTION Sprinkler Fitter - Residential **DISTRICT** 1

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES
IMPORTANT NOTE: "Residential fire protection work" is applicable to one or two family dwellings, all multiple family dwelling units which are permitted to have a single exterior up to and including four stories, townhouses with units stacked vertically up to and including four stories and group residential care facilities and protective care homes (sheltered housing), not to include nursing homes or ambulatory care facilities.

Per hour

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
Sprinkler Fitter	$ 37.82	$ 37.82	$ 39.96	$ 39.96

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 30.71	$ 31.71	$ 31.71	$ 32.71

OVERTIME PAY
See (B, H) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

1-669r

Teamster - Residential 07/01/2026

JOB DESCRIPTION Teamster - Residential **DISTRICT** 1

ENTIRE COUNTIES
Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

PARTIAL COUNTIES
Warren: Only the Townships of Bolton, Warrensburg, Thurman,Stony Creek, Lake George, Lake Luzerne and Queensbury.

WAGES
IMPORTANT NOTE: Applies to all rehabilitation work on residential structures. "Rehabilitation" shall be defined to include all work, including demolition, repair and alteration on any existing structure which is intended for residential use. On new housing, applicable only to site construction of all new work done by the Employer on one (I) family, two (2) family, row housing and garden type homes or apartments which are not more than four (4) stories above ground level and are used as dwellings.

GROUP # A:
Straight trucks, winch, transit mix on the site, road oilers,
dump trucks, pick-ups, panel, water trucks, fuel trucks on the site
(including nozzle).

GROUP # B:
Low boy or Low boy trailer, Euclids or similar equipment.

Wages per hour	07/01/2026
Group # A	$ 25.24
Group # B	25.46

SUPPLEMENTAL BENEFITS
Per hour
$ 30.56

OVERTIME PAY
See (B, E2, H) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (*5, 6) on HOLIDAY PAGE
*Labor Day, if worked, shall be paid at double time rate
Note: Any holiday which occurs on Sunday shall be observed the following Monday.

1-294r

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(B3)	Time and one half of the hourly rate after 40 straight hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays

(S) Two and one half times the hourly rate for Holidays

(S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.

(T) Triple the hourly rate for Holidays

(U) Four times the hourly rate for Holidays

(V) Including benefits at SAME PREMIUM as shown for overtime

(W) Time and one half for benefits on all overtime hours.

(X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth

NO TEXT FOR THIS PAGE

GENERAL CONDITIONS

ARTICLE 1 - SCOPE AND INTENT

Work Described. The Contractor shall furnish all labor, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies and other means of construction necessary or proper for performing and completing the Work in accordance with the Contract. The Contractor shall also obtain and pay for all required permits to complete the Work. Any labor, materials and equipment that have been omitted in the description of the Work, but that are necessary or proper for the completion of the Work, shall be furnished by the Contractor at its sole cost and expense. The Contractor shall protect the Work during construction, clean up the Site and maintain the Work until Final Acceptance.

Incidental work. The Contractor shall perform all tasks and pay all costs of cutting, protecting, supporting, maintaining, relocating and restoring all surface, sub-surface, and/or overhead structures, and all other property, including, but not limited to, pipes, conduits, ducts, tubes, chambers, and appurtenances, public or private, in the vicinity of and at the Site of the Work (except that which by law, franchise, permit, contract, consent or other agreement, the owner thereof is required to protect, support, maintain, relocate or restore), repair the same if damaged and restore to their original condition all areas disturbed. The Contractor shall perform all tasks and pay all costs of protecting, supporting, maintaining, relocating, replacing and restoring street equipment owned by the City and under the jurisdiction of the New York City Department of Transportation ("NYCDOT"), whether attached to utility company structures or connected to the underground electrical distribution system, including installing suitable temporary lighting equipment when the maintenance of permanent equipment is not feasible. All work done in connection with street lighting shall be in accordance with the requirements of NYCDOT or, for projects outside the City of New York, a local Authority Having Jurisdiction ("AHJ") over such work.

Duties of the Contractor. The Contractor shall ensure that the requirements of the Contract, including but not limited to, the Contract Drawings and Specifications, are fully and faithfully complied with by all subcontractors, materialmen and workmen at all times, that all of this Work is prosecuted with the utmost diligence, and that all materials are provided promptly in sufficient quantities in order not to delay the Work. The Contractor shall exercise the closest inspection of all materials delivered, promptly returning defective materials without waiting for their rejection by the Engineer. The Contractor shall also become thoroughly familiar with the Contract Drawings and Specifications and shall promptly report to the Engineer all errors, discrepancies or omissions discovered therein. The Contractor shall abide by the decisions and explanations of the Engineer made in regard to such matters.

Contractor Assumes Risk of Loss or Damage. The Contractor agrees to assume the risk and to make no claim on account of any and all loss or damage arising out of the nature of the Work to be done under this Contract, or for any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the effect of the elements, or from encumbrances on or near the line of the Work.

Local Laws. All materials, appliances and types or methods of construction shall be in accordance with the Contract and shall in no event be less than that necessary to conform to the requirements of the New York City Administrative Code, the Charter of the City of

New York (the "City Charter"), the Rules of the City of New York, and/or the applicable laws and rules of AHJs if the Work occurs outside the City of New York.

Ample quantities. The Contractor shall deliver materials in ample quantities to ensure speedy and uninterrupted progress of the Work in order to complete the Work within the Contract term.

Work and materials. All Work and materials mentioned in the Specifications and not shown on the Contract Drawings, and all Work and materials shown on the Contract Drawings and not mentioned in the Specifications, are to be furnished and performed as if the same were both mentioned in the Specifications and shown on the Contract Drawings.

Necessary and essential Work deemed included. In case any Work or materials shall be required for the more perfect performance of the Work, which are not specifically mentioned, specified or indicated on the Contract Drawings, in the Specifications, or other parts of this Contract, and which in the opinion of the Engineer are necessary and essential to a complete performance of this Contract, such Work or materials shall be deemed included within the requirements of this Contract. The Contractor hereby specifically promises, covenants and agrees to do and perform any and all such Work and to supply any and all such materials as if specifically provided for in this Contract.

Purport of schedules. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind and quality of materials and equipment included in Work to be performed under this Contract.

Order of Precedence. In the event of an actual conflict among the City of New York Standard Construction Contract, General Conditions, and the Contract Drawings and Specifications, the City of New York Standard Construction Contract will control, followed by the General Conditions, followed by the Contract Drawings and Specifications.

Conflicts between Contract Drawings and Specifications. If the Contract Drawings and/or the Specifications are in conflict, or, if the Contract Drawings or the Specifications, or both the Contract Drawings and the Specifications are not clear as to (a) the method of performing any part of the Work; (b) the types of materials or equipment necessary to perform the Work; or (c) the quantities required, the Contractor shall be deemed to have based its bid upon performing the Work and furnishing materials or equipment in the manner most expensive to the Contractor. If DEP determines that such conflict(s) exist or that a clarification is needed, the DEP will furnish the Contractor with supplementary drawings and/or specifications to address such conflict(s) or necessary clarification. In such event, the Contractor agrees to execute the Work in accordance with such interpretation, and to make no charge or claim for any extra or additional work or damage on account of such interpretation.

Understanding of the Contract Drawings and Specifications. The Contractor expressly declares and acknowledges that, before the signing of this Contract, it has carefully read the entire Contract, together and in connection with the Contract Drawings and Specifications, and that through such reading, the Contractor can determine the Work required pursuant to this Contract. The Contractor agrees that it will not hereafter make any claim or demand upon the City based upon or arising out of any alleged

misunderstanding or misconception of the said requirements, covenants, stipulations and restrictions of the Contract.

Deviations from Contract Drawings and Specifications. No deviation from the Contract Drawings and Specifications will be allowed, unless the same has been previously authorized in writing by the Commissioner or his/her designee.

ARTICLE 2 - PROVISIONS REFERENCED WITH INFORMATION FOR BIDDERS AND THE CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

(A) SCHEDULE "A" AND LIQUIDATED DAMAGES

1. Schedule “A” requirements for the Contract follow these General Conditions.

2. In view of the difficulty of accurately ascertaining the loss(es) which the City will suffer because of the Contractor exceeding substantial completion time for the Work, or failing to complete a designated milestone within the scheduled time for completion of such milestone, or failing to meet other requirements for which liquidated damages have been provided, the amounts set forth in Schedule A are hereby fixed and agreed to as liquidated damages that the City will suffer by reason of any such failure, and not as a penalty. The City of New York Standard Construction Contract, incorporated herein, shall govern with respect to assessment of all liquidated damages provided for in this Contract, not just those for failure to timely achieve substantial completion, unless specifically detailed in a Specification where any individual liquidated damages are specified.

(B) FEDERAL EXCISE TAXES

Pursuant to Section 37 of the "Information for Bidders", the Contractor may be exempted from the payment of Federal Excise Taxes in accord with the following:

1. An Excise Tax Exemption Certificate will be provided by DEP where requested by the Contractor, for items that fall within the scope of the Contract and may be exempt from the Federal Excise Tax.

(C) LABOR

Where labor is used under the Contract for intermediate skills and for which no prevailing rate of wages is herein certified, and where there is in existence at the time the Contract is entered into a labor agreement between the Contractor and a duly recognized labor union recognizing the existence of such skills, the Contractor shall pay not less than the rate so agreed upon between the Contractor and such labor organization for such skills.

(D) PARTIAL PAYMENTS FOR MATERIALS IN ADVANCE OF THEIR INCORPORATION IN THE WORK PURSUANT TO ARTICLE 42 OF THE CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

In order to better ensure the availability of materials, fixtures and equipment when needed for the Work, the Commissioner may authorize partial payment for certain materials, fixtures and equipment, prior to their incorporation in the Work, but only in

strict accordance with and subject to all the terms and conditions set forth in the following subdivisions numbered 1 to 15, unless another method of payment is elsewhere provided in the Specifications for specified materials, fixtures or equipment. For purposes of this Article 2(D), when the term “materials” is used, it shall also apply to fixtures and/or equipment.

1. The Contractor shall submit to the Commissioner a written request for payment for materials purchased or to be purchased for which the Contractor desires to be paid prior to their actual incorporation in the Work. The request shall be accompanied by a schedule of the types and quantities of materials, and shall state whether such materials are to be stored on or off the Site.

2. Where the materials are to be stored off the Site, they shall be stored at a place other than the Contractor's premises (except with the written consent of the Commissioner) and under the conditions prescribed or approved by the Commissioner. The Contractor shall set apart and separately store at the place or places of storage all materials and shall clearly mark same "Property of the City of New York", and shall not at any time move any of said materials to another off-site place of storage without the prior written consent of the Commissioner. Materials may be removed from their place of storage off the Site for incorporation in the Work upon approval of the Resident Engineer.

3. Where materials are to be stored at the Site, they shall be stored at such locations as shall be designated by the Resident Engineer and only in such quantities as, in the opinion of the Resident Engineer, will not interfere with the proper performance of the Work by the Contractor or by other contractors then engaged in performing Work on the Site. Such materials shall not be removed from their place of storage on the Site except for incorporation in the Work, without the approval of the Resident Engineer.

4. All costs, charges and expenses arising out of the storage of such materials shall be borne by the Contractor and the City hereby reserves the right to retain out of any partial or final payment made under the Contract an amount sufficient to cover such costs, charges and expenses. There shall be no increase in the Contract price for such costs, charges and expenses and the Contractor shall not make any claim or demand for compensation for provision of such storage.

5. The Contractor shall pay any and all costs of handling and delivery of materials to the place of storage, to any approved other place of storage, and from the place of storage to the Site of the Work and the City shall have the right to retain from any partial or final payment an amount sufficient to cover the cost of such handling and delivery.

6. In the event that the whole or any part of these materials are lost, damaged or destroyed in advance of their satisfactory incorporation in the Work, the Contractor, at its sole cost and expense, shall promptly replace such lost, damaged or destroyed materials with materials of the same character and quality.

7. Should any of the materials paid for by the City hereunder be subsequently rejected or incorporated in the Work in a manner not in accordance with the Contract, the Contractor shall remove and replace such rejected or improperly incorporated material with materials complying with the Contract. Until such materials are replaced, the City will deduct from the value of the materials or from

any other money due to the Contractor, the amount paid by the City for such rejected or improperly incorporated materials.

8. Payment for the cost of materials made hereunder shall not be deemed to be an acceptance of such materials in accordance with the Contract, and the Contractor always retains and must comply with its duty to deliver to the Site and properly incorporate into the Work only materials which comply with the Contract.

9. The Contractor shall retain any and all risks in connection with the damage, destruction or loss of the materials paid for hereunder to the time of delivery of the same to the Site of the Work and their proper incorporation in the Work in accordance with the Contract.

10. The Contractor shall comply with all applicable laws, rules and regulations of any governmental body or agency pertaining to the purchase, allocation and use of materials.

11. When requesting payment for such materials, the Contractor shall submit with the partial payment request, duly authenticated documents of title, such as bills of sale, invoices or warehouse receipts, all in quadruplicate. The Contractor shall provide along with its partial payment request for such materials, appropriate documentation transferring title to such materials from the Contractor to the City. In the event that the invoices state that the material has been purchased by a subcontractor, the Contractor shall also provide appropriate documentation demonstrating transfer of title to such materials from the subcontractor to the Contractor.

12. Where the Contractor, with the approval of the Commissioner, has purchased unusually large quantities of materials in order to assure their availability for the Work, the Commissioner, at his or her option, may waive the requirements of subdivision 11, provided the Contractor furnishes evidence in the form of an affidavit of the Contractor, and such other proof as the Commissioner may require, that it is the sole owner of such materials and has purchased them free and clear of all liens and other encumbrances. In such event, the Contractor shall pay for such materials and submit proof thereof, in the same manner as provided in subdivision 11 hereof, within seven (7) days after receipt of payment therefor. Failure on the part of the Contractor to submit satisfactory evidence that it has paid in full for all such materials shall preclude it from any payments under the Contract.

13. The Contractor shall include in any succeeding partial payment requisition a summary of materials stored which shall set forth the quantity and value of materials in storage, on or off the Site, at the end of each preceding payment period; the amount removed for incorporation in the Work; the quantity and value of materials delivered during the current period and the total value of materials on hand for which payment thereof will be included in the current payment requisition.

14. Upon proof to the satisfaction of the Commissioner of the actual cost of such materials and upon submission of proper proof of title as required under subdivisions 11 and/or 12 hereof, DEP will pay the Contractor Eighty Five Percent (85%) of the value of such materials, however, in no event shall the Eighty Five Percent (85%) payment exceed the estimated cost of such materials included in the approved detailed estimate breakdown submitted in accordance with Article 41 of the City of New York Standard Construction Contract; if the value exceeds such

estimated cost, the City will pay only Eighty Five Percent (85%) of such approved estimated cost.

15. Upon the incorporation in the Work of any such materials which have been paid for in advance of such incorporation in accordance with the foregoing provisions, payment will be made for such materials incorporated in the Work pursuant to Article 42 or Article 45 of the City of New York Standard Construction Contract, less any sums paid pursuant to subdivision 14 herein.

(E) CONFLICTS OF INTEREST

The City Charter in relation to conflicts of interest (Chapter 68, Section 2604) provides, among a number of safeguards, that:

(1) No employee or person whose salary is payable in whole or in part from the City treasury shall accept any valuable gift, whether in the form of service, loan, thing or promise, or any other form from any person, firm or corporation which to his or her knowledge is interested, directly or indirectly, in any manner whatsoever in business dealings with the City; and

(2) Any violation of any of the provisions of this section shall, at the option of the Comptroller, render forfeit and void the Contract, work, business, sale or transaction affected.

Other sections of the City Charter, the New York City Administrative Code and the New York State Penal Law are applicable in implementing the basic conflicts of interest section and under certain circumstances penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

Notice is hereby given that sections of the City Charter, the New York City Administrative Code and the New York State Penal Law alluded to herein shall apply under the terms of this Contract to circumstances relevant to conflicts of interest and shall be extended in application to subcontractors authorized to perform Work, labor and services pursuant to this Contract and further it shall be the duty and responsibility of the Contractor to so inform its subcontractors.

ARTICLE 3 – CONTRACT DRAWINGS AND SPECIFICATIONS

Related contracts. The Contractor shall study the requirements of any related contracts insofar as they affect the Work or as the Work may affect that of the related contracts and the Contractor will be required to coordinate its Work with that of all other related contractors performing work on such related contracts. The Contractor shall coordinate deliveries in order to avoid delaying or impeding the progress of the Work of any related contractor.

Contract Drawings and Specifications furnished to Contractor. After the Contract has been executed, the Contractor will be furnished with four sets of paper prints of the Contract Drawings and four set of Specifications of the Contract. The Contractor will also be furnished with one set of paper prints and Specifications of any related contracts.

Additional copies. Additional sets of Contract Drawings and Specifications may be issued provided such documents are available in sufficient quantity.

Supplementary drawings. When the Engineer decides to show more fully the Work to be done, or to show required changes, or to rectify errors which may have been discovered, drawings to be known as supplementary drawings and revision sheets with Specifications pertaining thereto will be provided to the Contractor. Changes of a minor nature may be made on the Contract Drawings, in which case the revised Contract Drawings will be issued to the Contractor. The supplementary drawings and revised Contract Drawings shall be as fully binding as the original Contract Drawings, and if such supplementary or revised Contract Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the City of New York Standard Construction Contract.

Information to subcontractors, manufacturers and others. The Contractor shall furnish each of its subcontractors and materialmen copies of such portions of the Contract, together with all necessary drawings and copies of Specifications, as may be required for the portion of the Work that the respective subcontractors or materialmen shall be responsible for.

Contractor to check drawings and other data. The Contractor shall verify all dimensions, quantities and details shown on Contract Drawings, plans, sketches, schedules, or on any other data received from the Engineer and shall notify the Engineer of all errors, omissions, conflicts and discrepancies found therein.

Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at its sole cost and expense. Figures shall be used in preference to scaled dimensions and large scale drawings in preference to small scale drawings.

"Directed", etc. Whenever reference is made in the Contract to the Work or its performance, the terms "directed", "required", "permitted", "ordered", "designated", "prescribed", "determined", and words of similar import shall imply the direction, requirement, permission, order, designation, or prescription of the Commissioner.

"Approved", etc. "Approved", "acceptable", "satisfactory", and words of similar import shall mean approved, acceptable or satisfactory to the Commissioner.

ARTICLE 4 - TEMPORARY STRUCTURES

Contractor's Field Office. The Contractor shall, during the period of construction, erect or provide for its own use a temporary field office in which readily accessible copies of all Contract Documents and approved Shop and Working Drawings shall be kept. The field office shall be located at the Site, where directed by the Engineer, and shall be provided with the equipment necessary for a functional field office, as approved by the Engineer.

Material Sheds. Material sheds used by the Contractor for the storage of tools, materials and equipment shall be kept at all locations so as not to interfere at any time with the progress of the Work, the location of which shall be subject to the absolute discretion of the Engineer.

Construction of Temporary Structures. All of the Contractor's temporary structures shall be fully constructed and have a neat appearance and shall be painted a uniform gray, unless another color is ordered by the Engineer.

Contractor's Sign. The Contractor shall post and keep posted at the Site, outside of the field office, exterior fence or wall, a legible sign with the full name and address of the Contractor, and the telephone numbers of responsible representatives of the Contractor who can be reached in the event of an emergency.

Private property. When the Contractor temporarily occupies property adjacent to the Work, it shall provide the Engineer with certified copies of agreements which permit the use of such land, unless such permission has been obtained by DEP prior to bidding.

Land for Contractor's use. The Engineer shall in all cases determine the portion of the Site to be used by the Contractor for storage, plant or other purposes.

Obstructions, access. The Contractor shall not obstruct any highway or access thereto from private property except as otherwise specified in the Specifications. The necessary facilities and safeguards to comply with this requirement shall be provided and maintained at the sole cost and expense of the Contractor. If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the Work or interfering with the work to be done by any other contractor, the Contractor shall remove and restack such materials at no additional cost to the City.

Trespassing prohibited. All employees and subcontractors of the Contractor are prohibited from trespassing on private or public property except where the law permits such entrance for a purpose such as underpinning or otherwise protecting adjoining structures. If it becomes necessary for employees of the Contractor or its subcontractor(s) to enter onto private property for the above stated reasons, the Contractor shall advise DEP of such need. Employees of the Contractor or subcontractor may not enter onto the property until the requisite permission has been obtained and proper notice furnished to the property owner.

ARTICLE 5 - CONTRACTOR'S SUPERINTENDENT

The Contractor shall employ and retain at the Site of the Work, from the commencement until the completion of the Work, a superintendent competent and capable of maintaining proper supervision and care of the Work and acceptable to the Engineer, and who, in the

absence of the Contractor and irrespective of any superintendent or foreman employed by any subcontractor, shall carry out the directions of the Engineer.

ARTICLE 6 - SURVEYS

Lines and grades. All Work shall be constructed according to the lines and grades shown on the Contract Drawings and approved by the Engineer. The Engineer will establish a baseline and benchmark. The Contractor shall establish all other lines, elevations and grades required for the Work and be solely responsible for the accuracy thereof. The Engineer shall be notified prior to the establishment of any line, elevation or grade.

Safeguarding marks. The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the Work, re-establish same if disturbed and bear the entire expense of rectifying work improperly installed due to not maintaining, not protecting or removing without authorization such established points, stakes, marks and monuments.

Survey before completion of structure. The Contractor for general construction work shall file with the New York City Department of Buildings in the borough where Work is being done or with the New York City Department of Small Business Services, or the local AHJ, a survey by a duly licensed surveyor showing the location of the new structure before completion of the structure, pursuant to Section 28.118.4 of the New York City Building Code or applicable local codes or regulations for projects outside the City. This survey shall show the location of the structure, the elevation of the first tier of beams or of the first floor, the finished grades of the open spaces on the plot, the established curb level and the location of all other structures on the plot, together with the location and boundaries of the lot or plot upon which the structure is constructed. One copy of the application and the survey shall be furnished to the Resident Engineer.

ARTICLE 7 - CONTRACTOR'S DAILY REPORTS

As soon as the Contractor has started Work on the Project, it shall submit to the Engineer written daily reports of the Work performed the previous day by any of its employees, including the employees of its subcontractors.

The reports shall be prepared by the Contractor's Superintendent and shall bear his or her signature. Each report shall contain the following information:

1. The type of materials and/or major equipment being installed by the Contractor and the total number of employees working in each category on that particular day.

2. The names of the subcontractors working and the type of materials and/or major equipment being installed by each together with the total number of employees working for each subcontractor on that particular day.

3. The major construction equipment being used by the Contractor and/or any subcontractor.

ARTICLE 8 – CONTRACTOR’S PLANT

The Contractor shall ensure that it obtains, provides and maintains a sufficient construction plant in close proximity to the Work all times during the progress of the Work in order to meet the demands of the Work, with ample margin for emergencies or

overload. The plant shall be of such capacity conducive to ensure the completion of the Work within the time stipulated in the Contract.

The Contractor may occupy any unused location within the area controlled by DEP with its construction plant, subject to the approval of the Engineer. If the Contractor desires to use additional area outside of that controlled by DEP, the Contractor shall arrange for the use of such area at its sole cost and expense. The location of the Contractor's stationary and mobile equipment shall be subject to the Engineer's approval.

The Engineer shall have the right to reject or condemn any construction plant, staging area, which, in his/her opinion, is unsafe, improper or inadequate. Whether or not the Engineer exercises this right, the Contractor shall not be relieved from its sole responsibility for the safe, proper and lawful construction, maintenance and use of such construction plant, staging area, or for the adequacy of such plant.

The Contractor shall, at its sole cost and expense, stack and restack as needed, all Project materials at locations that are easily accessible and convenient to the Project Site and that do not impede the progress of the Work, or as directed by the Engineer. The Contractor shall also take appropriate measures required to secure and protect all such materials from loss. Should the Contractor wish to stack any project materials on publicly mapped streets, it shall comply with all applicable local, state and federal laws, rules and regulations.

ARTICLE 9 - SECURITY GUARDS AND FIRE GUARDS ON THE SITE

The requirements of the Contract for security guard services and the responsibilities of the Contractor for safeguarding and protecting the Work and Site shall be in accordance with, but not limited to, the respective Division 01 Specifications.

The Contractor will be responsible for safeguarding and protecting its own Work, materials, tools, and equipment. When the provision of security guards is required, each Security Guard shall be required to possess a "Certificate of Fitness" issued by the Fire Department to qualify and serve as a Fire Guard whenever the structure under construction, alteration, or demolition exceeds the prescribed area and height requirements specified in Rule 2.4.1 of the "Rules for Erection, Alteration, Repair, Excavation for and Demolition of Buildings" adopted by the New York City Board of Standards and Appeals under Calendar Number 784-41SR. Each Security Guard shall, during his or her tour of duty, perform the duties of Fire Guards in addition to his or her security obligations.

The use of watchdogs requires the express written approval of DEP and at DEP’s sole discretion.

ARTICLE 10 - CERTIFICATES OF OCCUPANCY AND/OR COMPLETION

If the project structure is a building that is subject to the jurisdiction of the New York City Department of Buildings or similar local AHJ, before substantial completion of the project structure, the Commissioner will file an application for a Certificate of Occupancy or Certificate of Completion with the New York City Department of Buildings or New York City Department of Small Business Services or the local AHJ for project locations outside New York City, as applicable.

In connection with the application for Certificate of Occupancy or Certificate of Completion and before final payment is issued, the Contractor shall arrange for all final inspections by the inspection staffs of the New York City Department of Buildings, New York City Department of Small Business Services and other local AHJs for project locations outside New York City, as applicable, and shall do such remedial work and construction as is required and obtain all reports by such inspection staffs in order that the Certificate of Occupancy and/or Certificate of Completion or other similar certificate if occurring outside the City of New York be procured without delay.

ARTICLE 11 - COORDINATION AMONG CONTRACTORS

The Contractor is alerted to the importance of coordination and cooperation if other contractors are operating at or near the project Site. It is essential to the expeditious completion of this Project that the Contractor meet with any such other contractors at an early stage in the Work, to determine respective space requirements in areas where their operations or installations are in close proximity or are likely to be in conflict or interfere with each other, and to set up regular meetings as Shop Drawings are developed.

The Engineer will provide written notice of the time, place, and agenda of each such scheduled meeting.

The Contractor may also request a meeting by submitting a request for meeting to the Engineer.

Attendance at Coordination Meetings. To allow an orderly sequence of operations agreeable to all contractors, regular meetings shall be scheduled for the purpose of modifying work schedules and to address potential conflicts in work arrangements so that work stoppages and delays may be avoided. Coordination Meetings shall also be opportunities to prepare and circulate coordination drawings for the use and guidance of each contractor.

The Coordination Meetings will be arranged through the Engineer and shall be separate from and in addition to the regular job progress meetings. If it is desired that the architectural or engineering consultants be present at such meeting, this request should be directed to the Engineer.

The Contractor shall only send representatives to the meeting who have the competence and authority to make necessary decisions. Their statements shall commit the Contractor to the procedures, sequence of operations, and time schedules agreed upon.

The requirement to attend and effectively participate in all Progress and Coordination Meetings is subject to strict enforcement by the Commissioner. Failure to be represented at any of these meetings, when scheduled or approved by the Engineer, shall subject the Contractor to liability for any and all damages, delays, costs of alterations, etc., arising from the fact that it or its representatives were not present to coordinate its Work with the work that was scheduled, arrangements on or procedures developed at the meeting or meetings in question.

If, for compelling reasons, Contractor finds that its representative cannot attend a scheduled meeting, it shall give timely notice to the Engineer so that the meeting may be rescheduled.

Where procedures have been agreed upon and coordination drawings accepted by all contractors concerned, Contractor shall adhere to such drawings and procedures, both as to time and performance. No claim of delay or damages by a contractor, if it fails to comply, will be entertained by the Commissioner.

Contractor shall maintain at the Site sufficient competent personnel for the purpose of preparing layout and coordination drawings. Where such drawings are to be prepared by subcontractors, the subcontractor shall have the required personnel on Site in order to measure and asses proper, practical solutions found for problems arising from interferences, etc. and so that proper coordination among trades can be achieved.

ARTICLE 12 - PUBLIC DISSEMINATION OF INFORMATION

The Contractor agrees to hold confidential, both during and after the completion or termination of this Contract, all of the reports, information, or data, furnished to, or prepared, assembled or used by, the Contractor under this Contract. The Contractor agrees to maintain the confidentiality of such reports, information, or data by using a reasonable degree of care, and using at least the same degree of care that the Contractor uses to preserve the confidentiality of its own confidential information. The Contractor agrees that such reports, information, or data shall not be made available to any person or entity without the prior written approval of DEP. The obligation under this Article to hold reports, information or data confidential shall not apply where the Contractor is legally required to disclose such reports, information or data by virtue of a subpoena, court order or otherwise ("disclosure demand"), provided that the Contractor complies with the following: (1) the Contractor shall provide advance notice to the Commissioner, in writing or by e-mail, that it received a disclosure demand for such reports, information or data and (2) if requested by DEP, the Contractor shall not disclose such reports, information or data until the City has exhausted its legal rights, if any, to prevent disclosure of all or a portion of such reports, information, or data. The previous sentence shall not apply if the Contractor is prohibited by law from disclosing to DEP the disclosure demand for such reports, information or data.

The Contractor shall restrict access to confidential information to persons who have a legitimate work-related purpose to access such information. The Contractor agrees that it will instruct its officers, employees, and agents to maintain the confidentiality of any and all information required to be kept confidential by this Contract.

The Contractor, and its officers, employees, and agents shall notify DEP, at any time either during or after completion or termination of this Contract, of any intended statement to the press or any intended issuing of any material for publication in any media of communication (print, news, television, radio, Internet, etc.) regarding the services provided or the data collected pursuant to this Contract at least twenty-four (24) hours prior to any statement to the press or at least five (5) business days prior to the submission of the material for publication, or such shorter periods as are reasonable under the circumstances. The Contractor may not issue any statement or submit any material for publication that includes confidential information as prohibited by this Article.

SCHEDULE A

GENERAL CONDITIONS TO CONSTRUCTION CONTRACT
(INCLUDING GENERAL CONDITIONS RELATING TO ARTICLE 22 -- INSURANCE)

CONTRACT CAT-475

PART I. REQUIRED INFORMATION

INFORMATION FOR BIDDERS **BID BOND** The **Contractor** shall obtain a bid bond in the amount indicated to the right.	5 % of Bid
INFORMATION FOR BIDDERS **PERFORMANCE AND PAYMENT BONDS** The **Contractor** shall obtain performance and payment bonds in the amount indicated to the right.	100 % of Bid
CONTRACT ARTICLE 14. **DATE FOR SUBSTANTIAL COMPLETION** The **Contractor** shall substantially complete the **Work** in the number of calendar days indicated to the right.	1,102 consecutive calendar days
CONTRACT ARTICLE 15. **LIQUIDATED DAMAGES** If the **Contractor** fails to substantially complete the **Work** within the time fixed for substantial completion plus authorized time extensions or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the amount indicated to the right.	$ 2,000 for each consecutive calendar day over substantial completion time
Section 01 32 10 – Progress Schedule Liquidated Damages	$ 500 per day for delay of submittals
Section 01 33 00 - Submittal Procedures Liquidated Damages	$1,500 per each additional submission of a Shop Drawing after the third submission.

CONTRACT ARTICLE 17. **SUB-CONTRACTOR** The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price indicated to the right.	Not to exceed __40_% of the **Contract** price
CONTRACT ARTICLE 21. **RETAINAGE** The **Commissioner** shall deduct and retain until the substantial completion of the **Work** the percent value of the **Work** indicated to the right.	__5_% of the value of the **Work**
CONTRACT ARTICLE 22. **(Per Directions Below)**	
CONTRACT ARTICLE 24. **DEPOSIT GUARANTEE** As security for the faithful performance of its obligations, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to the percentage of the **Contract** price indicated to the right.	1% of **Contract** price
CONTRACT ARTICLE 24. **PERIOD OF GUARANTEE** Periods of maintenance and guarantee other than the period set forth in Article 24.1 are indicated to the right.	
CONTRACT ARTICLE 74. **STATEMENT OF WORK** The **Contractor** shall furnish all labor and materials and perform all **Work** in strict accordance with the **Contract Drawings**, **Specifications,** and all **Addenda** thereto**.**	Insert the Required Information Below.

CONTRACT ARTICLE 75. **COMPENSATION TO BE PAID TO CONTRACTOR** The **City** shall pay and the **Contractor** shall accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum **shown in the column to the right,** this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract.**	Amount for which the **Contract** was awarded: $ _____ [Agency: If the Bid Price, or any portion thereof, is based on unit prices, insert the words "Not to Exceed" before the amount.]

(GENERAL CONDITIONS RELATING TO ARTICLE 22 -- INSURANCE)

PART II. TYPES OF INSURANCE, MINIMUM LIMITS AND SPECIAL CONDITIONS

Note: All certificate(s) of insurance submitted pursuant to Contract Article 22.3. 3 must be accompanied by a Certification by Broker consistent with Part III below and include the following information:

- **For each insurance policy, the name and NAIC number of issuing company, number of policy, and effective dates;**
- **Policy limits consistent with the requirements listed below;**
- **Additional insureds or loss payees consistent with the requirements listed below; and**
- **The number assigned to the Contract by the City (in the "Description of Operations" field).**

Insurance indicated by a blackened box (■) or by X in a ☐ to left will be required under this contract

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Commercial General Liability Art. 22.1.1	The minimum limits shall be $__5,000,000_____ per occurrence, $5,000,000 for personal and advertising injury, and $__10,000,000_____ per project aggregate applicable to this Contract unless the Work requires a permit from the Department of Buildings and greater limits of Commercial General Liability Insurance are required pursuant to 1 RCNY section 101-08. Additional Insureds: 1. City of New York, including its officials and employees, with coverage at least as broad as ISO Forms CG 20 10 and CG 20 37, and 2. All person(s) or organization(s), if any, that Article 22.1.1(b) of the **Contract** requires to be named as Additional Insured(s), with coverage at least as broad as ISO Form CG 20 26. The Additional Insured endorsement shall either specify the entity's name, if known, or the entity's title (e.g., Project Manager). 3. [*Agency: If appropriate, insert names of other entities to be covered as Additional Insureds.]*
■ Workers' Compensation Art. 22.1.2	Workers' Compensation, Employers' Liability, and Disability Benefits Insurance: Statutory per

■ Disability Benefits Insurance Art. 22.1.2 ■ Employers' Liability Art. 22.1.2 ☐ Jones Act Art. 22.1.3 ☐ U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3	New York State law without regard to jurisdiction. **Note**: The following forms are acceptable: (1) New York State Workers' Compensation Board Form No. C-105.2, (2) State Insurance Fund Form No. U-26.3, (3) New York State Workers' Compensation Board Form No. DB-120.1 and (3) Request for WC/DB Exemption Form No. CE-200. The City will not accept an ACORD form as proof of Workers' Compensation or Disability Insurance. Jones Act and U.S. Longshoremen's and Harbor Workers' Compensation Act: Statutory per U.S. law.
■ Builders Risk Art. 22.1.4	100 % of total value of **Work** **Contractor** the Named Insured; the **City** both an Additional Insured and one of the loss payees as its interests may appear. Note: Builders Risk Insurance may terminate upon **Substantial Completion** of the **Work** in its entirety.
■ Commercial Auto Liability Art. 22.1.5	$___2,000,000___ per accident combined single limit If vehicles are used for transporting hazardous materials, the **Contractor** shall provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90

■ Contractors Pollution Liability Art. 22.1.6	$__1,000,000_____ per occurrence $__2,000,000__ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
■ Marine Protection and Indemnity Art. 22.1.7(a)	$__1,000,000___ per occurrence $___2,000,000__ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
■ Hull and Machinery Insurance Art. 22.1.7(b)	$__2,000,000__ per occurrence $__4,000,000__ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
■ Marine Pollution Liability Art. 22.1.7(c)	$____1,000,000_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

NO TEXT ON THIS PAGE

SCHEDULE A

GENERAL CONDITIONS TO CONSTRUCTION CONTRACT

PART III. BROKER'S CERTIFICATION

CERTIFICATES OF INSURANCE

Instructions to New York City Agencies, Departments, and Offices

All certificates of insurance (except certificates of insurance solely evidencing Workers' Compensation Insurance, Employer's Liability Insurance, and/or Disability Benefits Insurance) must be accompanied by one of the following:

(1) the Certification by Insurance Broker or Agent on the following page setting forth the required information and signatures;

-- OR --

(2) copies of all policies as certified by an authorized representative of the issuing insurance carrier that are referenced in such certificate of insurance. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

SCHEDULE A

CITY OF NEW YORK
CERTIFICATION BY INSURANCE BROKER OR AGENT

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

_____
[Name of broker or agent (typewritten)]

_____
[Address of broker or agent (typewritten)]

_____
[Email address of broker or agent (typewritten)]

_____
[Phone number/Fax number of broker or agent (typewritten)]

_____
[Signature of authorized official, broker, or agent]

_____
[Name and title of authorized official, broker, or agent (typewritten)]

State of …….)
) ss.:
County of …….)

Sworn to before me this _____ day of _____ 20___

_____
NOTARY PUBLIC FOR THE STATE OF _____

SCHEDULE A
(GENERAL CONDITIONS TO CONSTRUCTION CONTRACT)

PART IV. ADDRESS OF COMMISSIONER

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth below or, in the absence of such address, to the **Commissioner's** address as provided elsewhere in this **Contract**.

[**Note to Contracting Agency**: Fill in Risk Manager, ACCO or other person responsible for insurance]

NYC Department of Environmental Protection
Office of the Agency Chief Contracting Officer
59-17 Junction Blvd., 17th Floor Bid Room
Flushing NY, 11373
Email: insurance@dep.nyc.gov

SPECIFICATIONS

NO TEXT FOR THIS PAGE

SECTION 01 11 00 – SUMMARY OF WORK
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section provides a summary of Work for contract CAT-475.

B. Section Includes:

1. Location and Description of Work
2. Work Included in the Contract
3. Related Construction Contracts
4. Inspection before Bidding
5. Site Characterization Reports and Information
6. Hazardous Soils Investigation
7. Datum Plane

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	14
1.07	Submittals	14
1.08	Delivery, Storage, and Handling	14
1.09	Spare Parts, Special Tools, and Supplies	15
1.10	Warranty	15
PART 2	PRODUCTS	15
2.01	Manufacturers	15
2.02	Materials / Equipment	15
2.03	Fabrication / Assembling / Finishes	15
2.04	Source Quality Control / Shop Tests	15
PART 3	EXECUTION	15
3.01	Examination / Preparation	15

3.02 Application.....15
3.03 Field Testing / Quality Control 15
3.04 Startup / Demonstration 15
3.05 Adjusting / Protection / Cleanup.....15

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. All Contract Documents, including all other specifications sections in the Contract, apply to this Section.

1.04 REFERENCES

A. Abbreviations / Acronyms:

1.	BKGV	Bonneted Knife Gate Valve
2.	HLO	High Level Outlet
3.	HLRT	High Level Release Tower
4.	LCS	Local Control Station
5.	NAD83	North American Datum of 1983
6.	NAVD88	North American Vertical Datum of 1988
7.	MGD	Million Gallons per Day
8.	OIT	Operator Interface Terminal
9.	SCADA	Supervisory Control and Data Acquisition
10.	UGC	Upper Gate Chamber

B. Definitions:

1. Unwatering: Removal of water from a structural space or mechanical component.

C. Reference Standards: [No new references are used in this Section]

1.05 DESCRIPTION

A. Location of Work

1. The site of the Work to be performed under Contract CAT-475 is Gilboa Dam at Schoharie Reservoir, which is located in the Catskills Mountain region of New York State approximately 125 miles north-northwest of

Manhattan, New York. Schoharie Creek is the main waterway flowing into the Schoharie Reservoir. Gilboa Dam, constructed between 1919 to 1927, forms Schoharie Reservoir with a storage capacity of 17.6 billion gallons. The Gilboa Dam is located on the northern end of the reservoir, at the Town of Gilboa, Schoharie County near the convergence of Greene, Delaware, and Schoharie Counties and just north of Prattsville, New York. Gilboa Dam is located approximately 2½ miles north of the Shandaken Tunnel Intake Chamber, from which raw water is diverted to the Esopus Creek and thence to Ashokan Reservoir, the Catskill Aqueduct, and to the City.

2. The Contractor shall confine his construction activities to the City-owned property and to the area where he is performing work as shown on the Contract Drawings. Minimal space is available at the Schoharie Reservoir site for construction staging.

   a. Site #1: West End of Gilboa Dam and Spillway

      1) Site Boundaries: Work area includes the Spillway from Monoliths 14 to 18, inclusive, the existing Upper Gate Chamber (UGC), condensate manhole, top of West Training Wall, and in the reservoir upstream of the UGC. Contractor and Construction Management trailers, staging and laydown areas shall be selectively allowed at the Gate 19 entrance along the West Access Road, the Road 8 spur at the former Emergency Control Center, and the grassy area lying just downstream of the embankment portion of the dam.

      2) Work Access to Site #1: BWS Gate 19 on U.S. Rte. 30, the West Access Road (BWS), the embankment dam crest roadway, construction barges, and temporary work platforms. Gate 19 is a secured entrance with an existing security booth to be manned by the Contractor.

   b. Site #2: North Training Wall Area Including Tailwater Plunge Pool and End Sill

      1) Site Boundaries: Work area includes the field immediately downstream of the North Training Wall that encompasses control panel CP-8, the existing concrete stairways leading to the End Sill, the concrete armored slope on the right creek bank, the End Sill, the downstream concrete apron, and the sloping slabs immediately upstream of the End Sill. Contractor parking and limited laydown may also be permitted along the North Training Wall Access Road and Boneyard Road (both are BWS site roads) subject to limitations in the Contract Documents.

      2) Work Access to Site #2: BWS Gate 16 on Rte. 990V provides access to both Boneyard Road and the North Training Wall Access Road. The End Sill is only accessible

by foot along the existing stairway; there is no vehicular access to the End Sill. Gate 16 is a secured entrance with an existing security booth to be manned by the Contractor.

c. Site #3: Shandaken Tunnel Intake Chamber (STIC) Campus

1) Site Boundaries: The STIC property shall be used under CAT-475 solely for launch and retrieval of watercraft to support construction work at the dam. Neither modifications to the existing features nor contractor laydown and staging are to be performed at the STIC campus.

2) Work Access to Site #3: Ungated access from Rte. 23 onto Intake Road (a.k.a. BWS Road 7), which leads to the STIC Building.

3. Cell phone reception in the location of Work is poor and may not be consistently available at the project site.

B. Work Included in the Contract.

1. Contract Name: CAT-475-CON, High Level Outlet (HLO) Installation at Gilboa Dam and Crest Gate Removal.

2. Work Description: A HLO will be constructed at Gilboa Dam. The HLO intake will be a two-chambered structure, referred to as the High Level Release Tower (HLRT) housing the hydraulic controls on an enclosed operating floor. The HLRT shall be equipped with guide slot assembly, twin bonneted knife gate valves, an air vent pipe, and a removable bar rack, which can be switched with a removable temporary bulkhead. The HLRT shall be constructed upstream of the existing UGC against the upstream face of the dam at monolith M18. A tunnel will be hand-mined through the dam and entirely within spillway monolith M18 within which a new pipe shall be constructed to convey water from the HLRT to an Outfall Structure at the downstream Spillway steps. The existing Spillway crest gates that occupy the Spillway notch in monoliths M15, M16 and M17 shall be removed along with their ancillary mechanical and electrical equipment, instrumentation, and controls in the UGC. After the gates are removed, the portion of the Spillway presently occupied by the crest gates shall be backfilled with reinforced mass concrete to match the crest and Spillway step pattern on monoliths M1 through M14. Other components of the Work include installation of fall protection features, a waterproof access door, stairways, and hatches and instrumentation upgrades that include remote monitoring and control of the HLO flow, integrated into the existing SCADA system, and flow monitoring within the HLRT and at the plunge pool's end sill.

3. Principal Items of Work:

a. Structural Work:

1) Construction of the reinforced concrete HLRT at the upstream face of the dam:
   a) Tremie Concrete Pad on existing wing wall and new Coarse Aggregate (underwater placement).
   b) Structural reinforced concrete Base Slab with stay-in-place stainless steel forms (underwater placement).
   c) Furnish and erect temporary and stay-in-place steel forms / cofferdam (underwater placement) to facilitate HLRT construction in the dry.
   d) Structural tremie concrete Wedge Wall placed against the upstream face of the dam using stay-in-place stainless steel forms (mostly underwater placement).
   e) Drilled and grouted vertical and horizontal bars placed both above and below reservoir surface (mostly underwater work, the extent of which will depend upon prevailing pool level during the work).
   f) Unwatering of the cofferdam.
   g) HLRT reinforced concrete vertical walls, operating floor slab, superstructure walls, roof slab, and parapet, as well as reconstruction of surrounding penetrations for personnel access.
   h) Concrete/masonry demolition of an access opening through existing top of dam parapet above the UGC.
   i) Concrete/masonry demolition of a doorway opening through UGC upstream wall and masonry façade face of dam.
2) Construction of the High Level Outlet through the Spillway:
   a) Construction of temporary work platform at downstream Spillway steps to facilitate construction.
   b) Hand mining an approximately 7½-foot-high by 7-foot-wide Tunnel through Spillway.
   c) Installation of rock dowels and tunnel ceiling reinforcement, as required.
   d) Chemical grout injection of upstream masonry façade around the tunnel perimeter.
   e) Grouting/concrete backfill of annulus around outlet pipes within Tunnel.

f) Construction of the reinforced concrete Outfall Structure walls and slabs.

g) Reconstruction of Spillway steps within tunneled area, including textured form liner on vertical step risers.

3) Modifications to the Gated Spillway Notch include:

a) Abandonment in-place by grouting the existing embedded air lines and conduits within Spillway.

b) Demolition at the Spillway notch including Spillway step noses, 2-foot-wide eastern abutment wall of the gated notch in monolith M14, and demolition of portions of the existing downstream stairways on east and west ends of the gated notch.

c) Mass reinforced concrete placement at Spillway crest and downstream Spillway steps, including textured form liner on vertical step risers.

4) Miscellaneous structural work includes:

a) Demolition and removal of existing UGC roof hatch and concrete curb, and restoration of continuous reinforced concrete roof slab.

b) Construction of reinforced concrete access stairs on monolith M18.

c) Concrete modifications related to the installation of instrumentation at the End Sill and conduits leading to hand hole HH-82.

b. Civil Work:

1) Debris removal and cleanup of the HLRT foundation areas (underwater work).

2) Backfill area below HLRT tremie concrete foundation area east of the upstream west wing wall with coarse aggregate (placed underwater).

3) Maintenance, removal and disposal of the existing debris boom located upstream of the dam.

4) Removal and disposal of existing debris stranded on the spillway crest within the Limit of Work area.

5) Diversion of water to accomplish the Work.

c. Architectural Work including furnishing and installing:

1) Steel watertight door, aluminum floor hatches, and ceiling hatches at the HLRT.

2) New access ladders and fall protection system in HLRT.

3) Extension of existing Spillway crest fall protection rail system in monoliths M14 through M17.

4) New stairway handrails, existing handrail modifications, and single-point fall protection tie-offs at monolith M18.

5) Waterproofing the HLRT and UGC roof, tie-ing into the undisturbed / existing waterproof membrane on the UGC roof.

6) Masonry façade and stone cap on existing parapet modifications adjacent to the HLRT roof.

d. Mechanical Work:

1) Furnish and install:

a) two 30-inch-diameter bonneted knife gate valves (BKGV) with stems, stem guides, operating floor stands, and electric actuators.

b) 30-inch-diameter and 48-inch-diamater steel outlet pipe, including temporary pipe support cradles and braces.

c) 6-inch-diameter steel drain pipe.

d) 8-inch-diameter steel air vent pipe for HLO Pipe.

2) Removal and disposal:

a) off-site moveable crest gate leaves, brackets, bladders and hardware from the gated Spillway notch in monoliths M15, M16 and M17.

b) off-site three air compressors, three air driers, two pressure tanks, and all related fittings and piping from the UGC.

c) off-site associated crest gate air lines and valves in the Condensate Drain Manhole.

3) Modify and relocate the existing UGC floor drain vent stack penetrating the UGC roof.

e. Electrical, Instrumentation and Control Work:

1) Electrical demolition at UGC.

2) New power supply to two electric valve actuators installed in the HLRT superstructure.

3) New lighting and electrical supply receptacles in the HLRT operating room and lower dry well chamber.

4) New exterior pole mounted lighting.

5) Modifications and additions to the lightning protection system.

6) New local control stations (LCSs), within the UGC with open/close controls and position monitoring functions, both locally at actuators and LCSs, and remotely from UGC operator interface terminal (OIT) and SCADA systems at the Water Supply Control Center.

7) New float sensors installed near the bottom of the dry well of the HLRT.

8) Termination of power and controls for the crest gate system in the UGC.

9) Relocation of existing HVAC, lighting, and intercom panels within the UGC.

10) Relocation / modification of electrical utilities in the UGC disturbed by structural demolition.

11) Relocation of instrumentation cables from the existing weather station and reservoir level sensors into new conduits.

12) Installation of flow monitoring devices, controls, and conduits at the HLO and tailwater plunge pool.

13) New lighting protection system features at HLRT and M18.

f. Other Work:

1) Site security.

2) Dust, Soil Erosion and Sediment Control.

3) Waste management and disposal.

4) Sampling and testing of suspect/unforeseen hazardous/contaminated materials and remediation and disposal of confirmed hazardous and/or contaminated materials.

5) Unwatering of Work areas and continuous seepage control and water management not described under other Work items.

6) Site restoration of disturbed areas, as needed.

7) Items Not Listed: Work of this Contract also includes any other items shown on the Contract Drawings or identified in the Specifications that are unmentioned in this Section.

C. Other Construction Contracts

1. Contracts in Progress or Contracts to be Started:

a. The CAT-212E Gilboa Dam Site Restoration Project entails substantial regrading and planting of vegetation throughout the Gilboa Dam campus.

b. Work completed under CAT-212E will not be disturbed under CAT-475 unless specifically identified on the Contract Drawings.

2. For contracts in progress, drawings, specifications and schedules will be available for inspection at the Bureau of Engineering Design and Construction, 5th Floor, Low Rise, 96-05 Horace Harding Expressway, Corona, New York 11368-5107.

3. For contracts to be started while this Project is in progress, the contract documents, when completed for bidding purposes, will be available for inspection by the Contractor at the above address.

D. Inspection before Bidding

1. Before bidding, the Contractor is advised to visit the Site of the work. The Contractor shall obtain all necessary information of any and all conditions which may affect in any way the performance of their work and their bid prices under their Contracts. All pertinent data and dimensions with regard to existing construction shall be verified by the Contractor.

2. Access to the site for inspection purposes prior to bidding will only be on the date advertised for the pre-bid tour.

3. The Contractor may examine the drawings of existing facilities used in preparation of the Contract Drawings, which will be available on PASSPort. All such material and information are expressly excluded from and are not a part of this Contract and are available for information purposes only. The existing information is listed in Article 1.05.F.

E. Site Characterization Report

1. Supplemental information includes borings, samples, laboratory test results, and a topographical survey at the Site. In addition to the existing information listed in Article 1.05.F, the following CAT-475 design documents prepared by Gannett Fleming/Hazen & Sawyer Joint Venture are available on PASSPort for inspection by bidders:

a. **ECAR_from_final_FPR.pdf**: Existing Conditions Assessment Report (ECAR), Rev.0, dated 1 April 2023.

b. **CAT-475-DES GDR_GIR_v1 (2024.05.16_draft).pdf**: Geotechnical Data and Interpretive Report (GDIR), Rev.1, dated 16 May 2024.

c. **Topo_Report--2024.11.04.pdf**: Site Topographic and Underground Utilities Survey Report, Rev.0, dated 4 November 2024.

2. All such material and information relating to boring records and subsurface conditions are expressly excluded from and are not a part of this Contract and are available for information purposes only.

F. Project-specific Select References

1. **Folder** of Original Construction: The folder includes available engineer's annual reports, drawings, and specifications of the original Gilboa Dam construction.

a. **Annual Report 1921.PDF**: Board of Water Supply of the City of New York, Sixteenth Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1921, New York City, 1 January 1922.

b. **Annual Report 1922.PDF**: Board of Water Supply of the City of New York, Seventeenth Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1922, New York City, 1 January 1923.

c. **Annual Report 1923.PDF**: Board of Water Supply of the City of New York, Eighteenth Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1923, New York City, 1 January 1924.

d. **Annual Report 1924.PDF**: Board of Water Supply of the City of New York, Nineteenth Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1924, New York City, 1 January 1925.

e. **Annual Report 1925.PDF**: Board of Water Supply of the City of New York, 1 January 1926, Twentieth Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1925, New York City.

f. **Annual Report 1926.PDF**: Board of Water Supply of the City of New York, Twenty-first Annual Report, Accompanied by Report of the Chief Engineer, for the Year 1926, New York City, 1 January 1927.

g. **Contract 203 Specs.PDF**: Gilboa Dam specifications.

h. **Folder** of Contract 203 Drawings including available contract, working, and record drawings.

2. **Folder** of GZA Documents

   a. **GZA Final Report For The Gilboa Dam and Schoharie Reservoir.PDF**: GZA, Final Report for the Gilboa Dam and Schoharie Reservoir, subtitled Contract CAT-146, Capital Project No. WM-30, Detailed Study/Investigation for the Reconstruction of the Dams in the Catskill & Delaware Watersheds, prepared for The City of New York Department of Environmental Protection, prepared by GZA GeoEnvironmental of New York, Buffalo, New York, September 2003.

   b. **GZA Summary Report of Geological Survey.PDF**: GZA, Summary Report of Geological Survey, subtitled Contract CAT-146, Capital Project No. WM-30, Detailed Study/Investigation for the Reconstruction of the Dams in the Catskill & Delaware Watersheds, prepared for The City of New York Department of Environmental Protection, prepared by GZA GeoEnvironmental of New York, Buffalo, New York, November 1999.

3. **CAT-211 PDR.PDF**: JV, Gannett Fleming/Hazen and Sawyer A Joint Venture, Preliminary Design Report for Reconstruction of Gilboa Dam, CAT-211, Volumes I, II, and III, June 2008.

4. Inclinometers Data

   a. **Folder** of inclinometer plots for Borings GIL-22, GIL-L-1 through GIL-L-7, GIL-L-14, GIL-L-15, and GIL-RW-1 and GIL-RW-2.

5. Reservoir Level Historical Data

   a. **NYCDEP Schoharie Reservoir Data (1927-2002).pdf**: A combination of USGS records and City Records.

   b. **USGS Historical Average Daily Reservoir Elevation Data.txt**: USGS Gage No. 01350100 average daily data for the period January 1, 1975 through February 17, 2005.

   c. **USGS Historical Real-time Reservoir Elevation Data.txt**: USGS Gage No. 01350100 15-minute data for the period October 1, 1991 through February 17, 2005.

6. CAT-212A Site Preparation Documents

   a. **CAT-212A Site Prep Dwgs.PDF**: CAT-212A Site Preparation, Conformed Drawings, Schoharie Reservoir, Gilboa Dam and Associated Facilities Reconstruction, July 2009.

   b. **CAT-212A Site Prep Specs.PDF**: CAT-212A Site Preparation, Conformed Specifications, Schoharie Reservoir, Gilboa Dam and Associated Facilities Reconstruction, June 2009.

   c. **CAT-212A Site Prep Change Orders.PDF**: CAT-212A Site Preparation, Change Orders Available To Date, Schoharie

Reservoir, Gilboa Dam and Associated Facilities Reconstruction, Dates Vary.

7. GIL-01 Debris Barrier Documents

   a. **Folder** of Debris Barrier Drawings: Contract GIL-01 Bid Drawings and Addenda, Schoharie Reservoir Debris Barrier, December 2005.

   b. **Folder** of Debris Barrier Specifications: Contract GIL-01 Bid Specifications and Addenda, Schoharie Reservoir Debris Barrier, December 2005.

   c. **Submittal 001 – Tuffboom Debris Barrier.PDF**: Worthington Products, Tuffboom™ Product Literature, Log and Debris Booms – Waterway Safety Barriers, May 2005.

8. CAT-274B Spillway Notch Documents

   a. **CAT-274B Notch Dwgs.PDF**: CAT-274B Conformed Drawings, Gilboa Dam Interim Spillway Modifications, Schoharie Reservoir, Spillway Notch, January 2006.

   b. **CAT-274B Notch Specs.PDF**: CAT-274B Conformed Specifications, Gilboa Dam Interim Spillway Modifications, Schoharie Reservoir, Spillway Notch, January 2006.

9. CAT-275 Anchor Documents

   a. **CAT-275 Anchor Report.PDF**: JV, Gannett Fleming/Hazen and Sawyer A Joint Venture, Gilboa Dam Interim Stability Improvements Post-Construction Report, CAT-275 Post-Tensioned Rock Anchors, August 2008.

   b. **CAT-275 Anchor Dwgs.PDF**: CAT-275 As-Built Drawings, Gilboa Dam Interim Stability Improvements, Schoharie Reservoir, Post-Tensioned Anchors, August 2008.

   c. **CAT-275 Anchor Specs.PDF**: CAT-275 Conformed Specifications, Gilboa Dam Interim Stability Improvements, Schoharie Reservoir, Post-Tensioned Anchors, March 2006.

   d. **CAT-275 Anchor Change Order.PDF**: CAT-275 Change Order #2, Gilboa Dam Interim Stability Improvements, Schoharie Reservoir, Post-Tensioned Anchors, October and November 2006.

10. CAT-359 Crest Gate Documents

   a. **CAT-359 Gates Dwgs.PDF**: CAT-359 Gilboa Dam Crest Gates, Conformed Drawings, Schoharie Reservoir, Gilboa Dam and Associated Facilities Reconstruction, November 2008.

b. **CAT-359 Gates Specs.PDF**: CAT-359 Gilboa Dam Crest Gates, Conformed Specifications, Schoharie Reservoir, Gilboa Dam and Associated Facilities Reconstruction, October 2008.

c. **CAT-359 Change Orders.PDF**: CAT-359 Gilboa Dam Crest Gates Change Orders folder containing the following:

1) Crest Gate Modifications

2) Siphon Stairs

3) Grading Drainage Erosion

4) Monolith 18, Siphon Valves.

11. CAT-212B Spillway Reconstruction Documents

a. CAT-212B Gilboa Dam Reconstruction Dwgs.pdf: Conformed January 2011.

b. CAT-212B Gilboa Dam Reconstruction Information For Bidders, Standard Construction Contract, and Specifications.pdf: Conformed January 2011.

c. Folder of CAT-212B JV Boring Logs

1) Summary Table of Boring Locations.pdf

2) Boring Logs for Reconstruction.pdf

3) 212B Boring Plans.pdf.

4) ATL Boring Logs_GIL-212B-3, 4, 5 & 6.pdf. These borings were drilled during Contract CAT-212B. Note that Borings GIL-212B-1 and -2 were not drilled.

d. Folder of JV laboratory test results of soil and rock samples. Note that the majority of rock test results for Contract CAT-212B are provided separately in the CAT-211 PDR.

1) CAT-212B JV Lab Testing.pdf

2) Summary Table of Lab Testing.pdf

e. Fall Protection Systems Shop Drawings and Product Data.pdf

f. **CAT-212B Crest Gates O&M Manual R3.pdf**: CAT-212B contractor submittal of O&M Manual following relocation of equipment into Upper Gate Chamber.

g. **CAT-212B Concrete summary.pdf**: Summary of CAT-212B concrete quality control tests.

h. **Gilboa Dam Upper Gate Chamber As-Builts.pdf**: Hand sketches from Resident Engineer of utility and conduit embedments.

12. CAT-212C Low Level Outlet Documents

    a. CAT-212C_Conformed_Dwgs_Vol.1-2015.03 (Scale_Warning)-bookmarks.PDF: Schoharie Reservoir Low Level Outlet drawings, Volume 1 of 2.

    b. CAT-212C_Conformed_Dwgs_Vol.2-2015.03 (Scale_Warning)-bookmarks.PDF: Schoharie Reservoir Low Level Outlet drawings, Volume 2 of 2.

    c. **CAT-212C Spec Book Vol 1 – Conformed Mar 2015.PDF**: Schoharie Reservoir Low Level Outlet construction specifications, Volume 1 of 2.

    d. **CAT-212C Spec Book Vol 2 – Conformed Mar 2015.PDF**: Schoharie Reservoir Low Level Outlet construction specifications, Volume 1 of 2..

13. CAT-212E Site Restoration Documents

    a. **_90373-001 CAT-212 E – Fullset-Conformed.PDF**: CAT-212E Site Restoration contract drawings.

    b. **CAT-212E_Specifications Conformed.PDF**: CAT-212E Site Restoration construction specifications.

G. Datum Plane: As shown on the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Temporary Site Development Plan: Contractor's temporary modifications to the existing site and associated restoration upon completion of Work shall be described in a Temporary Site Development Plan, which shall be submitted for approval. The Plan shall include, at a minimum, a narrative description of intended modifications, plan views and/or cross section sketches to illustrate the nature of intended modifications, and any applicable engineering analyses needed to demonstrate that no harm will be induced upon existing project features due to Contractor's modifications. Plan shall address items such as, but not necessarily limited to, topsoil stripping and stockpiling at laydown areas; temporary removal, storage of conflicting site features such as guard rails, fencing, etc.; installation of temporary access and safety features; placement of temporary shoring, timber mats, temporary fill materials for crane pads and access/laydown areas, as applicable. Plan shall also describe Contractor's intended restoration of all affected areas to a condition that equals or exceeds the condition at the start of work. Plan may cross-reference, rather than repeat, other specific submittals or Plans that are required elsewhere in these Contract Documents.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 14 00 – WORK RESTRICTIONS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Normal Project Working Hours
2. Demolition and Hauling
3. Concrete
4. Land for Contractor's Use
5. Emission Control Technology for Non-Road Vehicles
6. Vehicle Idling Time
7. Water Quality Restrictions
8. Weather Restrictions
9. Reservoir Restrictions
10. Site Access
11. Material Deliveries to the Site
12. Water and Sanitary Conveniences
13. Construction Sequence Constraints
14. Regulatory Permit Requirements
15. Compliance with Quality of Life Requirements
16. City Fleet and Truck Safety
17. Environmentally Friendly Oils and Anti-Freeze

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	11
1.07	Submittals	11
1.08	Delivery, Storage, and Handling	12
1.09	Spare Parts, Special Tools, and Supplies	12
1.10	Warranty	12

PART 2 PRODUCTS 12
2.01 Manufacturers 12
2.02 Materials / Equipment 12
2.03 Fabrication / Assembling / Finishes 12
2.04 Source Quality Control / Shop Tests 12
PART 3 EXECUTION.....12
3.01 Examination / Preparation 12
3.02 Implementation 12
3.03 Field Testing / Quality Control 13
3.04 Startup / Demonstration 13
3.05 Adjusting / Protection / Cleanup.....13

C. The following exhibits, attached after the End of Section designation, are a part of this Section:

1. Exhibit A - Local Law 77: DEP Monthly Reporting Forms

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 51 30 – Temporary Electrical System

1.04 REFERENCES

A. New York City Administrative Code, Section 24-163

B. New York City Executive Order No. 39 of 2024 – Improving City Fleet and Truck Safety

1.05 DESCRIPTION

A. Working Hours

1. "Normal Project Working Hours" for this Contract are between the hours of 7:00 AM through 10:00 PM Monday through Friday, and 7:00 AM through 8:00 PM Saturday, March through November, and from 7:00 AM through 8:00 PM Monday through Saturday, December through February (except for holidays). The Contractor shall have the management, labor, equipment and subcontracted capabilities needed to complete the Work within the Period of Performance indicated in the General Conditions – Schedule A, by working only during "Normal Project Working Hours".

2. No construction operations shall occur between 8:00 PM Saturday and 7:00 AM Monday, except as noted in paragraph 1.04.A, unless emergency or safety issues arise.

3. No delivery trucks shall be allowed at the site before 7:00 AM or after dusk.

4. Delivery of bulk materials, including aggregate, cement, fly ash, etc., shall not occur during regular Gilboa/Conesville-Central School District busing times.

5. Due to data collection schedule for Control Panel CP-8, instrumentation work associated with CP-8 and the end sill shall commence after 8:00 AM hours to ensure data continuity.

6. The Contractor shall abide by all federal, state and local laws, rules and regulations governing or restricting the performance of the Work, both during and outside Normal Project Working Hours.

7. The Contractor is advised that strict adherence to the local noise control code is mandatory, and that the Contractor shall be responsible for assuring that any required variance(s) from restrictions on construction hours are obtained.

8. The Work shall be substantially completed (as defined where applicable in Article 14 of the Standard Construction Contract) within the period of performance specified in Schedule "A" of the General Conditions; all in strict accordance with the Contract Documents. The Contractor will make no claim for extra compensation solely because of additional costs to meet the scheduled dates.

9. If the Contractor for any reason fails to adhere to the official project schedule, the Contractor shall promptly adopt such other or additional means and methods of construction sufficient to make up for the time lost and assure completion of the Work in accordance with said schedule. The City may require the Contractor to adopt such corrective measures as the Engineer deems necessary, appropriate and adequate to recover lost time; and may also direct the Contractor to propose corrective measures for consideration (without any obligation by City to adopt the same), at no additional cost to the City.

10. The Contractor is advised that it has the option to work beyond the Normal Project Working Hours to complete all intermediate activities, contract milestones and to meet the date of substantial completion of the Work as defined by Article 14 of the Standard Construction Contract and not exceed the period of performance as shown in Schedule A of the General Conditions.

11. The Contractor shall have sufficient forms, shoring and other construction materials; labor; permanent materials; equipment; tools and supervision available to support a second shift and/or scheduled overtime.

12. If the Contractor desires to work beyond the Normal Project Working Hours, the Contractor must first submit a request in writing to the Engineer at least five business days in advance of beginning such work and shall not perform such work until written approval is granted. The Contractor shall adhere to any local laws or ordinances that may govern or restrict the performance of such work. Requirements for the provision and use of temporary light and power outside Normal Project Working Hours are included in Section 01 51 30 – Temporary Electrical System.

B. Demolition and Hauling

1. Demolition, demolition debris cleanup, onsite hauling and offsite hauling will not be allowed outside of Normal Project Working Hours. Any hauling that utilizes 990V shall be considered offsite hauling.

C. Concrete

1. Concrete placement will be allowed to commence as early as 4:00 AM Tuesday through Saturday during hot summer days if required. The Contractor must first submit a request in writing to the Engineer and shall not perform such work until approval is granted.

D. Land for Contractor's Use

1. The Contractor shall confine their construction activities to the City-owned property and to the area where they are performing work as shown on the Contract Drawings. Minimal space is available at the Schoharie Reservoir site for construction staging.

2. The available area is limited and shall be shared with facility operations personnel and the Engineer. Should the Contractor require additional space, they shall provide the space off-site and all such costs and arrangements shall be at their own expense.

3. DEP reserves the option to require the Contractor to vacate their assigned areas within sixty days after notice by DEP.

4. It is intended that the CAT-212E contractor (see Section 01 11 00 Summary of Work) shall primarily utilize the existing facilities at Boneyard Road. Therefore, the Boneyard Road Staging Area will only be available to the CAT-475 Contractor for limited use and only with written approval of the Engineer. Consequently, CAT-475 shall primarily utilize the Gate 19 and West Access Road areas. The Contractor shall coordinate with the prime contractor of CAT-212E and with DEP for use of shared

areas for construction staging of materials, contractors' temporary offices, and temporary supporting utilities.

E. Emission Control Technology for Non-Road Vehicles

1. The Contractor shall complete and submit to the Engineer the attached Local Law 77: DEP Monthly Reporting Forms (Exhibit A, attached to this Section) to report on usage of Ultra Low Sulfur Diesel (ULSD) fuel and Best Available Technology in diesel-powered non-road vehicles for reducing emission of pollutants on a monthly basis.

2. Non-road vehicles include, in addition to vehicles cited in Local Law 77, Article I.E, all earthmoving trucks and other motor vehicles that remain on Site. The Contractor shall submit shop drawings for on-site refueling stations including information for a certified fuel provider, containment areas, spill notification plan and remediation plan.

F. Vehicle Idling time

1. Idling time shall be limited to three consecutive minutes for all delivery, concrete and materials trucks as well as all other diesel-powered equipment (hereinafter referred to as a mobile source) except as follows:

   a. When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control.

   b. When it is necessary to operate heating, cooling or auxiliary equipment installed on the mobile source when such equipment is necessary to accomplish the intended use of the mobile source.

   c. To bring the mobile source to the manufacturer's recommended operating temperature.

   d. When the outdoor temperature is below twenty (20) degrees Fahrenheit.

   e. When the mobile source is being repaired.

2. The Contractor shall meet the requirements of the Section 24-163 (f) of the NYC Administrative Code, regarding vehicle idling time adjacent to schools.

G. Water Quality Restrictions

1. The Contractor shall isolate Work from the Reservoir and watercourses using oil booms, straw bales, filter berms, or other means approved by the Engineer.

2. All Contractor operations shall be conducted in such a manner as to ensure the protection of the public water supply and watercourses and compliance with all permits for the project. All necessary precautions shall be taken to

prevent the introduction of pollutants into the water supply and watercourses.

3. Equipment, tools, and vehicles shall be prohibited from use until DEP or Resident Engineer is satisfied that the requirements of paragraph their work does not impede the NYSDEC mandated minimum reservoir releases as required in Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6NYCRR).

   The NYSDEC water body classification is as follows: Schoharie Creek (Water Index Number H-240-82 portion, including P630a portion – Class B), and Schoharie Reservoir (Water Index Number H-240-82-P638a – Class AA)

   The class designations shall be maintained at all times during construction and after completion of all Work in accordance with NYSDEC Water Quality Regulations Title 6, Chapter X, Part 879. Any sediment and erosion control structures including cofferdams, turbidity curtains, and/or dewatering operations must accommodate fish passage. Any debris or excess material from construction of this project shall be immediately and completely removed from the banks of all water or wetland areas to an appropriate upland area for disposal.

   The Contractor shall be responsible for accommodating water levels actually present during the construction period.

   Any debris, excavated materials and excess material from construction and/or demolition work shall be immediately and completely removed from the banks of all water areas and wetland areas to an approved off-site disposal location. The Contractor must obtain DEP approval before using any off-site disposal site.

   With the exception of concrete placement performed during the installation of the High Level Release Tower, the Contractor shall at no time allow wet concrete or concrete leachate to enter into the waterway, including washings from concrete trucks, mixers and other devices. Debris and excess material from construction shall never be disposed of in waterways or surface water bodies (even if the disposal site is outside the DEP watershed).

H. Weather Restrictions

1. When weather conditions exist or are anticipated that exceed the storm water handling capabilities of the work area, the work must cease and the Contractor must undertake all reasonable efforts to prevent uncontrolled discharges, such as creating temporary rock dams. Work can resume after the Resident Engineer has inspected storm water controls and corrective action has been completed and approved. The Contractor is responsible for all corrective action related to the work area with no additional cost to the

City. The Contractor is responsible for all releases into surrounding waters at the work area.

2. When weather conditions occur that compromise worker safety, on-water equipment integrity, or the stormwater best management practices in place for the work, work must cease. The Contractor is responsible for all corrective action related to the operation at no additional cost to the City.

I. Reservoir Restrictions

1. On-water activities shall be confined to the designated boat launch area and to work areas adjacent to the dam.

2. All barges and other water craft for reaching the work areas must be launched from the Shandaken Tunnel Intake Chamber (STIC) as indicated in the Contract Drawings.

3. **Contractor must have all boats, dredgers, barges, equipment and tools of any type that will be used in or on the Reservoir steam-cleaned and inspected by DEP prior to entry into any New York City Reservoir.** The cleaning and inspection process requires the following:

   a. The Contractor shall drain all water from the vessel and its components (including outdrive units, all bilge water (if applicable), live wells (if applicable), and raw engine cooling systems) at the body of water it is leaving prior to it being inspected. Contractor shall hand-remove all debris including dirt, grass, mussels and other organisms, etc., from the vessel and from any pedestals, chains, ropes, anchors or other related equipment that has been in contact with any surface waters. This applies to boats, dredgers, barges and equipment of any type.

   b. After the vessel is drained of all water, the Contractor shall chlorinate all ballast tanks using a five percent (5.0%) chlorine solution. The chlorinated water must completely fill the ballast, contacting all interior surfaces, for a period of 48 hours. The water must then be discharged in a manner approved by DEP. This water may not be discharged near any stream or body of water. The Resident Engineer or their representative shall be present when the chlorination is to begin, and the Contractor shall demonstrate that the water used is properly chlorinated.

   c. The Contractor shall thoroughly steam clean the vessel inside and outside. If for any reason the vessel cannot be steam cleaned, it must be left out of water to dry for a minimum of 14 days. The vessel must be protected from rainwater during this period to ensure that it remains dry for the entire 14 days. The Contractor shall notify the Resident Engineer in writing as to why the vessel cannot be steam cleaned, where it will be stored to dry, the method

of protection from rain, and when the drying period is to begin. The Contractor shall make the vessel available for inspection by the Resident Engineer or DEP personnel at any time.

d. DEP will conduct a thorough inspection of the vessel interior and hulls, outdrive units, trim plates, trolling plates, props and prop guards, transducers, anchor and rope or chain, live wells, the visible portions of the vessel's pumping systems, and all other parts and accessories including all trailer parts. Additionally, the vessel and its components will be inspected to confirm that they have been drained and chlorinated (as described above). This thorough inspection by the DEP applies to all boats, dredgers, barges and equipment of any type.

e. All divers' dress shall be disinfected with a sodium hypochlorite solution. Disinfection of all divers' dress, equipment and tools shall be witnessed by DEP.

4. If zebra mussels or other organisms are discovered during inspection, the Contractor shall be responsible for removing the mussels or other organisms and placing them in a secure container for proper disposal.

5. After being cleaned and inspected as described in Article 1.05.I.3. above, ballast tanks may be filled with reservoir water. However, this water may not be discharged back into the reservoir. No ballast exchange is allowed in any of New York City's reservoirs.

J. Site Access

1. Comply with all requirements of Section 01 55 00 - Vehicular Access and Parking.

K. Material Deliveries to the Site

1. The Contractor shall submit to DEP Police and the Resident Engineer a weekly schedule of deliveries to the work site.

L. Water and Sanitary Conveniences

1. Comply with all requirements of Section 01 51 11, Temporary Water and Sanitary Services.

M. Construction Sequencing Constraints

1. Construction sequencing constraints for the High Level Release Tower are provided on the Contract Drawings.

N. Regulatory Permit Requirements

1. The Contractor shall comply with the requirements of existing permits for the duration of the contract.

2. Contractor shall review the permit requirements of existing permits and include in the Bid sufficient monies to meet work restrictions imposed by regulatory permits and will make no claim for extra compensation solely because of additional costs to meet the imposed work restrictions.

3. The Contractor shall comply with work restrictions imposed by New York State Department of Environmental Conservation (NYSDEC) Article 11 Endangered/Threatened Species Incidental Take Permit (NYSDEC # 4-4334-00043/00027) as stated in the aforementioned permit and as described below:

   a. The Contractor shall comply with the following work restrictions if the eagles occupy nest location NY236B and/or 236C:

      1) No construction related activity is permitted within the 330-foot federal buffer zones from January 1 through July 31 annually for the duration of the contract unless NYSDEC determines in writing that breeding activity for the year has ceased.

      2) If by August 1, all eagle chicks have sustained flight in the area for at least two weeks, work within 660 feet of the nest can commence until December 31. If chicks have not sustained flight for two weeks, work cannot begin until they do so based on a determination by an environmental monitor.

      3) Access in the 330-foot to 660-foot federal buffer zones during the bald eagle breeding period (January 1 to July 31) is severely restricted. During this period activity is limited to construction vehicle traffic passing through the buffer zones on adjacent roads to and from the active worksite.

      4) The use of backup alarms is prohibited within the 660 buffer zone.

   b. The Contractor shall provide training for all personnel on the proper procedures specified in the NYSDEC training protocols on how to handle potential encounters with Timber Rattlesnakes so as to prevent injury to both personnel and Rattlesnakes as well as to protect Rattlesnake nesting habitat.

   c. The Contractor shall comply with work restrictions imposed by the Department of the Army Nationwide General Permit Numbers 3 and 43 and as described below:

      1) All in-reservoir dredging shall occur between July 1 and March 31 in any year which this permit is in effect or amended thereof.

2) Upon completion of the specified activities, all temporary fills within the waters of the United States shall be removed and the areas shall be restored to pre-construction contours and conditions and/or as specified.

d. Tree clearing is not expected under this Contract. If unanticipated tree clearing were to be requested by DEP, it shall only occur between November 1st-March 31st in order to avoid disturbance to roosting long-eared bats.

O. Compliance with Quality of Life Requirements

1. The Contractor is strongly advised that the City regards the preservation of "Quality of Life" as a high priority for the community near a DEP construction project. The Contractor, therefore, will be held to the strictest account in its adherence to Contract requirements and all applicable ordinances, rules, and regulations that relate to "Quality of Life". These include: noise control, vibration control, dust control, particulate control, rodent control, cleanliness and maintenance of the site and surrounding areas, and adherence to traffic and parking stipulations.

2. When the Contractor is determined to be noncompliant with "Quality of Life" requirements, as described in the paragraph above, the Contractor shall be subject to the following measures:

a. Where non-compliance with a "Quality of Life" requirement is not corrected within a timeframe specified by the City, work may be ordered to stop until such measures as the City deems satisfactory are taken to resolve the problem and prevent future occurrence. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for additional costs or damages by the Contractor.

3. The Contractor shall cooperate fully with the Engineer to prevent, address and resolve any and all "Quality of Life" issues, which may arise from time to time, by whatever means necessary, all at no additional cost to the City.

4. The Contractor's record of compliance with "Quality of Life" requirements for this project and its efforts to coordinate with the Engineer and comply with his/her directions in this regard will be reflected in the Contractor's Evaluation. This Evaluation will become a part of the Contractor's record of doing business with the City of New York and may affect the Contractor's ability to be awarded future projects.

P. City Fleet and Truck Safety

1. The Contractor shall comply with the requirements of New York City Executive Order No. 39 of 2024 (EO 39), and BEDC EHS Standards Chapter 29 – Vehicles and Truck Safety.
2. The Contractor shall submit to the Engineer a Fleet Safety Plan, as required by EO 39.

Q. Environmentally Friendly Oils and Anti-Freeze

1. For all projects where work is occurring in an environmentally sensitive area, the Contractor shall ensure the following:
   a. All off-road heavy equipment and watercraft utilizes environmentally friendly, vegetable oil based, hydraulic fluids such as, EAL 224H as manufactured by Mobil, or approved equal.
   b. All off-road heavy equipment and watercraft utilizes environmentally friendly, propylene glycol based, antifreeze such as, Fleet Charge PG as manufactured by Old World Industries, or approved equal.
2. Environmentally Sensitive areas include:
   a. Areas in the New York City water supply watershed.
   b. On, or adjacent to, a reservoir, wetlands, streams, rivers, brooks, ponds, or other waterbody.
   c. Adjacent to any storm water collection system.
   d. Facilities or structures located on, or a part of, the aqueduct.
   e. Any other area deemed as such by the DEP or other regulatory agency.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Quality of Life Compliance Plan

1. The Contractor shall submit a “Quality of Life” Compliance Plan for review and approval by the Engineer. This plan shall address all work required by the Contractor to satisfy the “Quality of Life” requirements as specified herein.
2. Work at the Site shall not commence until the Contractor’s “Quality of Life” Compliance Plan is approved.

B. Fleet Safety Plan

C. Environmentally Friendly Oils and Anti-Freeze Documentation

1. The Contractor shall submit documentation necessary to demonstrate compliance with environmentally friendly oils and environmentally friendly anti-freeze requirements as specified herein:

a. Safety Data Sheet (SDS)

b. Self-certification, on company letterhead, confirming compliance with the requirements specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

EXHIBIT A – LOCAL LAW 77: DEP MONTHLY REPORTING FORMS

FORM LL-77

LOCAL LAW 77: DEP MONTHLY REPORTING FORM 1

Contractor: _____ Report # _____ Covering the Mo/Yr of: _____

Contractor Address: _____ Contractor's Phone: _____

Project Name: _____ Project # _____ Address: _____

DEP Representative or PM Contact Name: _____ DEP Representative or PM Contact Number: _____

The New York City of Environmental Protection requires its contractors to file this form so that it can repor to the DEP on USAGE of Ultra Low Sulfur Diesel (ULSD) fuel in diesel powered non-road vehicles, and the use of Best Available Technology (BAT) for reducing emissions of pollutants, as required by NYC Local Law 77 of 2003.

									DEP approved BAT installed (DEP sticker must be applied to vehicle indicating BAT type and date installed)					
Prior Months Used On Site	Days Used This Month	Est. Future Usage Months	Type	Make	Year	Model #	VIN #	HP Rating	Date Installed	Make	Model	LL-77 Category I(a),I(b),I(c), II, III	DEP waiver* required	DEP Decal No.

* Attach copy of DEP Waiver if BAT requirement is waived for any reason during all or part of the contract period.

Page 1 of 2

LOCAL LAW 77: DEP MONTHLY REPORTING FORM 2

Contractor: _____ Report # _____ Covering the Mo/Yr of: _____

Project Name: _____ Project # _____ Address: _____

DEP Representative or PM Contact Name: _____ DEP Representative or PM Contact Number: _____

SUMMARY OF LISTED EQUIPMENT AND BAT

Total pieces of Equipment used on site this Month = _____ **Total that used BAT this Month = _____**

Total pieces of equipment used on site this Calender Year = _____ **Total that used BAT this Year = _____**

DECLARATION OF COMPLIANCE

By signing this document, I certify that the information provided is accurate, and that all non-road diesel-powered vehicles used on the project during the reporting period by my employees and subcontractors are included, and that all BAT retrofits have been selected and installed in accordance with LL 77, including the Use of ULSD (Ultra Low Sulfur Diesel) fuel.
Note 1: Diesel fuel powered nonroad vehicles/equipment's used for fewer than twenty calendar days on the contract are exempt from BAT requirement.
Note 2: DEP will audit sites to ensure forms are accurate. Fines for non-compliance and fraud will be levied by DEP against the Contractor according to the terms of the Law.

Signed: _____ **Date:** _____

Print: _____

Contractor Name and Title

☐ **There are other Prime Contractors on this site whose equipment is not included here.**

Page 2 of 2

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor is encouraged to and is authorized to develop, prepare and submit to the Agency Chief Contracting Officer or his/her designee (the "ACCO"), in writing, Value Engineering Proposals (VEPs) for modifying the plans, Specifications or other requirements of the Contract for the sole purpose of reducing the net cost of construction.

B. VEPs shall not impair, in any manner, the essential functions or characteristics of the Project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, design, and safety standards.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Application	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. VEP Cost Sharing and Payment

1. VEP net cost savings and payment shall be determined as follows:

2. "Net Cost Savings": means the total reduction in Contractor cost of performance resulting from the acceptance of the VEP minus allowable Contractor development and implementation costs.

3. The City's cost to review, design and implement the VEP shall be determined by the ACCO and fifty (50%) percent of such cost shall be deducted from the total Contract price as part of a VEP change order.

4. Payment for an accepted VEP shall be reflected in the adjusted total contract price per the following:

   a. Original Contract price for the Work;

   b. Less fifty percent (50%) of Net Cost Savings;

   c. Less fifty percent (50%) of the City's Cost.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Abbreviations / Acronyms:

1. VEP - Value Engineering Proposal

1.05 DESCRIPTION

A. Consideration of VEPs

1. The provisions of this Section shall not be construed to require DEP to consider any VEP, which may be submitted hereunder.

2. If a VEP submitted by the Contractor is similar to a change in the Contract Documents under consideration by DEP for the Project at the time said VEP is submitted, or if such a VEP is based upon or similar to Specifications, policy or details adopted by DEP after the advertisement for the Contract and prior to conceptual discussion between the Contractor and DEP, DEP will not accept such VEP and reserves the right to make such changes without compensation to the Contractor under the provisions of this Section.

3. A VEP that requires a material change in Contract scope will not be considered as an acceptable VEP.

B. The ACCO Is Sole Judge

1. The ACCO will be the sole judge of the acceptability of a VEP.

2. In determining the net cost savings, DEP reserves the right to disregard the Contract bid prices if in the judgment of the ACCO, such prices do not represent a fair measure of the value of Work to be performed or to be deleted.

C. Continuation of Contract Work

1. The Contractor shall continue to perform the Work in accordance with the requirements of the Contract until an executed change order incorporating an accepted VEP has been issued. If an executed change order has not been issued by the date upon which the Contractor's VEP specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, such VEP shall be deemed rejected.

1.06 QUALITY ASSURANCE

A. All approved VEPs shall deliver the same quality of product, finish, or workmanship as originally specified under the Contract.

1.07 SUBMITTALS

A. General

1. The Contractor's VEP submittal shall include the following in order to be considered for approval by the ACCO:

a. Cover letter proposing the VEP and written description.

b. Complete description of the difference between the existing Contract requirements and those proposed, listing of advantages and disadvantages associated with the VEP, and effect, if any, the VEP has on the performance of the Work.

c. Preliminary sketches.

d. List and analysis of the Contract requirements that must be changed if the VEP is accepted, including proposed Specification requirements.

e. A separate, detailed cost estimate showing the affected portions of the existing Contract requirements and the cost savings associated with the VEP. The VEP cost estimate shall include an itemization of the Contractor's development and implementation costs along with all costs attributable to Subcontractors. This cost estimate shall be correlated, where required, with the original detailed estimate breakdown submitted by the Contractor.

f. Description and estimate of the costs DEP may incur implementing the VEP.

g. Prediction of effect the VEP will have on DEP's Operations and Maintenance costs should the VEP be accepted.

h. Statement of time by which a change order must be issued to achieve maximum value and cost reduction, noting any time impact on Contract milestones and the completion date. This statement shall be correlated with, where required, the baseline construction schedule in use for monitoring progress.

i. If the ACCO notifies the Contractor that additional information is required to evaluate the VEP, such information must be provided in a timely manner; otherwise, the VEP will be rejected.

2. The VEP shall be submitted to the ACCO for review and processing.

3. VEPs may be submitted at any time following the Notice to Proceed and up to 90 days prior to the latest accepted date for Substantial Completion.

B. Contract Time

1. Acceptance of a VEP and performance of the Work thereunder shall not extend the time for completion of the Contract unless specifically provided for in the Contract change order implementing the VEP.

C. VEP Design Requirements

1. Upon acceptance of the VEP, the ACCO will incorporate the VEP into the Contract Documents. The cost to revise and update the Contract Documents shall be included in the DEP's cost.

D. VEP Review and Acceptance

1. Within 15 days after the date of submittal of the VEP, the ACCO shall notify the Contractor of the status of the review of the VEP proposal. If DEP requires additional time to evaluate the Contractor's VEP, the ACCO will notify the Contractor of the additional review time required within such 15-day period.

2. The Contractor has the right to withdraw the VEP at any time during the review process.

3. Any VEP may be accepted in whole or part at the ACCO's discretion.

4. DEP expressly reserves the right to adopt a VEP for use on other contracts administered by it.

5. The accepted VEP shall be incorporated into the Contract pursuant to a change order. The change order will include any changes in the quantities of unit bid items and new agreed price items, as appropriate.

6. The ACCO will provide to the Contractor, along with the notification of the acceptance of the VEP, an assessment of DEP's cost in order to finalize VEP cost sharing and payment arrangements as defined in this Section. This will be used in determining the VEP change order amount.

E. Conditions

1. The following conditions shall apply to any VEP accepted by the ACCO:

a. Bid prices may not be based on the anticipated approval of a VEP, and if a VEP is rejected, the Contractor will be required to complete

the Contract in accordance with the plans and Specifications at the prices bid.

b. Where a VEP has been approved and implemented by change order but subsequent modifications to the VEP are necessary in order to adjust for unanticipated field or other conditions, any further change order(s) to implement those subsequent modifications will provide for payment for any additional Work at prices no higher than those in the Contractor's bid, as if such Work was being done in accordance with the original Contract requirements.

c. If the Engineer determines that unsatisfactory results are being obtained as a result of Work performed pursuant to an implemented VEP, he/she may reject all or any portion of such Work and direct its removal, and require the Contractor to proceed in accordance with the original Contract requirements. The change order required to "reverse" the VEP shall not entitle the Contractor to compensation for any Work performed under the failed VEP or for its removal. Such rejection or limitation of reimbursement shall not constitute the basis of any claim against DEP.

d. All terms and conditions of the Contract, including quality of the Work and inspection, shall apply to a VEP accepted by the ACCO as if the VEP was included originally.

e. The Contractor shall have no claim against DEP due to or arising from the ACCO's rejection of a VEP.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Total Bid Price for the Contract shall include the following items in the Bid Schedule of Prices.

1. Lump Sum Prices (Contract Items LS-1 through LS-3)

2. Unit Price Items (Contract Item UP-1)

3. Allowances (Contract Items A-1 and A-2)

B. Excluding the Allowance and Unit Price items specified in this Section, no separate payment will be made for the Work. All costs thereof shall be included by the Contractor in its lump sum prices bid for the Contract.

C. Payment of the Total Bid Price shall be in accordance with the requirements of the Contract Documents.

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Application	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

1.04 REFERENCES

A. Definitions

1. Normal Work Day: One (1) project working day with Normal Project Working Hours as stipulated in Section 01 14 00 – Work Restrictions.

1.05 DESCRIPTION

A. Lump Sum Price Contract Items

1. Contract Item LS-1 - Mobilization

a. Under Contract Item LS-1 - Mobilization, the Contractor shall offset all costs necessary to commence the Work, including but not limited to, staging and production, supervision and prefinancing as required under this Contract.

b. The value for Mobilization, as indicated on the Bid Schedule of Prices, shall not exceed six percent (6%) of the Total Bid Price for the Contract, excluding the bid values for all Allowance Items. Should the Contractor's bid for mobilization exceed 6%, the Mobilization Item shall be adjusted to 6% with any overage added to LS-2 Work Result. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation.

c. The Contractor shall be paid one-half of Mobilization in the first partial payment.

d. The Contractor shall be paid the remainder of Mobilization in a subsequent partial payment after all of the following deliverables are completed to the satisfaction of the Resident Engineer:

1) Performance and Payment Bonds per Schedule A.

2) Insurance per Schedule A.

3) Preliminary and Final Schedule of Values per Section 01 29 10 – Schedule of Values.

4) Preliminary CPM Schedule per Section 01 32 10 – Progress Scheduling.

5) Final Detailed CPM Schedule per Section 01 32 10 – Progress Scheduling.

6) Submissions pertaining to Environmental, Health, and Safety Requirements per Section 01 35 27 – Environmental Health and Safety Requirements.

7) Installation of the project information panel and its supports per Section 01 58 13 – Temporary Project Signage.

e. The 5% retainage specified in Schedule A applies to all payments including those for Mobilization.

f. The payments for Mobilization do not apply to costs associated with change orders.

2. Contract Item LS-2 – Work Result

a. Contract Item LS-2 has been provided on the Bid Schedule of Prices as a lump sum price for all Contract Work not inclusive of Mobilization, De-Mobilization, Unit Prices and Allowance items.

b. Payment under Contract Item LS-2 will constitute full compensation for all labor and materials required to complete all Work under this Contract, with the exception of Mobilization, De-Mobilization, the Unit Price Items and Allowances as specified herein and shown on the Bid Schedule of Prices.

3. Contract Item LS-3 – De-Mobilization

a. Under Contract Item LS-3 – De-Mobilization, the Contractor shall offset all costs necessary to de-mobilize the Work, including but not limited removal of all temporary facilities, materials, and equipment from the Site, as well as removal of all Contractor's facilities in the staging area, as required under this Contract. The following Work shall be compensated by Contract Item LS-3 – De-Mobilization:

1) Removals pertaining to Temporary Water and Sanitary Services per Section 01 51 11 - Temporary Water and Sanitary Services.

2) Removals pertaining to Temporary Electrical Systems per Section 01 51 30 - Temporary Electrical Systems.

3) Removals pertaining to Temporary Field Office Trailers per Section 01 52 10 - Temporary Field Office Trailers.

4) Removals pertaining to Traffic Control per Section 01 55 26 - Traffic Control.

5) Removals pertaining to Temporary Barriers and Enclosures per Section 01 56 00 - Temporary Barriers and Enclosures.

6) Removals of the project information panel and its supports per Section 01 58 13 - Temporary Project Signage.

7) Final Cleaning per Section 01 74 17 - Cleaning and Site Maintenance.

8) Providing all Operations and Manuals as required under this Contract per Section 01 78 25 – Operation and Maintenance Manuals.

9) Final Record Documents per Section 01 78 39 - Final Record Documents.

The value for De-Mobilization, as indicated on the Bid Schedule of Prices, shall not exceed one percent (1%) of the Total Bid Price for the Contract, excluding the bid values for all Allowance Items. Should the Contractor's bid for De-mobilization exceed 1%, the De-Mobilization Item shall be adjusted to 1% with any overage added to LS-2 Work Result. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation. Notwithstanding any other Contract Item, Contract Item LS-3 shall not be considered to pay for Work to be paid under other Contract Items included elsewhere in the Contract, and shall be considered in addition to any such other Contract Items. The Contractor shall be paid the De-Mobilization Price in the Final Payment for the Work, after the Resident Engineer has certified that all Work under this item has been satisfactorily completed.

B. Unit Price Items

1. Contract Item UP-1 has been provided on the Bid Schedule as a unit price for the Contract.

   a. Payment under Contract Item UP-1 will constitute full compensation without limitation for all services, labor and materials, necessary to complete a respective unit of work.

   b. The Contractor and the Engineer shall meet and jointly review the Contractor's "pencil copy" of the payment request prior to submission. The payment request shall include the quantity of unit price Work performed during the performance period.

2. Contract Item UP-1 – City-Ordered Suspension and Resumption of Operations

   a. Description: Under Contract Item UP-1, the Contractor shall suspend operations during diversion of water for the high level release tower and spillway work in accordance with the Contract Documents and as directed by the Engineer. Suspension of operations includes removing all personnel, equipment, tools, unfixed temporary construction works and materials from the affected or potentially affected areas of the spillway crest, spillway stepped face, spillway channel, and area of the high level release tower construction as directed by the City. Resumption includes restoring equipment, items, tools, materials, and temporary construction features required to continue the work. The unit price shall include the labor, equipment, materials, handling, incidentals, protection of the Contractor's work and diversion of water system, and other items necessary and required to complete the suspension of operations for an indeterminate amount of time and the

resumption of operations in accordance with the Contract Documents. All related costs shall be included in the unit price bid for this item. Payment for will not be made for inclement weather, equipment change-out/modification/overhaul/maintenance, delays incurred by Contractor's failure to have adequate labor, equipment, or materials on site, for work stoppage delays due to permit compliance, or due to environmental factors such as ice or wave run up on the reservoir and other related factors.

b. Measurement for Payment: Full suspension and resumption will be made at the Contract unit price bid per occurrence for Contract Item UP-1. The Contractor shall have no claim for additional compensation beyond that described herein for Contract Item UP-1.

C. Allowances

1. Allowance Contract Item A-1 and A-2

a. Descriptions of the Work to be performed under the allowances can be found in the related Sections referenced herein. The amounts of the allowances are given in the Bid Schedule of Prices. The Allowances will be included, as listed under this paragraph, in the Total Bid Price for the Contract.

b. All work under the Allowance items shall be performed on a Time and Material basis. Price to be paid shall be the actual and reasonable cost, calculated in accordance with Articles 26.2.1 through 26.2.13 (excluding Article 26.2.10) and Article 26.3 of the City of New York Standard Construction Contract. The words "Extra Work" in the above referenced Articles shall be substituted with "Allowances" as outlined in this Section.

2. Contract Item A-1: Remediation and Disposal of Suspect or Unforeseen Hazardous or Contaminated Materials

a. Description: Contract Item A-1 is provided for payment for Remediation and Disposal of Suspect or Unforeseen Hazardous or Contaminated Materials, following confirmatory sampling and testing under the Lump Sum LS-2. The scope of the Allowance, Work performed, and payment for the Remediation and Disposal of Suspect or Unforeseen Hazardous or Contaminated Materials shall be in accordance with the requirements of Specification 01 35 45 – Hazardous Materials Control. The Allowance shall be used for such materials encountered over the course of demolition, excavation, dredging, and removal of debris trapped against the Debris Boom, as specified in the Contract Documents.

3. Contract Item A-2: Debris Boom Maintenance and Operation

a. Description: Contract Item A-2 will be used for paying Contractor for approved maintenance and repair of the existing reservoir debris

boom as well as removal and off-site disposal of non-hazardous and non-contaminated debris that may have become trapped against the debris boom. This Allowance also includes DEP-requested operation of the debris boom for DEP's on-water activities as needed. Debris Boom Maintenance and Operation shall be performed by the Contractor's personnel. The location of the debris boom is shown on the Contract Drawings.

b. This Allowance shall only be used for debris boom maintenance and repair as directed in writing by the Engineer and for Contractor-requested operation of the debris boom approved in writing by the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 29 10 – SCHEDULE OF VALUES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preliminary Schedule of Values (SOV)
2. Final SOV
3. Cross Reference Listing
4. Changes to the SOV
5. Table 1 – Preliminary SOV (Major Work Results)
6. Table 2 – Final SOV (Minimum Detail Required)

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 – Progress Scheduling

1.04 REFERENCES

A. Schedule of Values: A breakdown of the (Contractor's) lump sum bid price for the Contract or of lump sums bid for items of the Contract, excluding any values associated with mobilization, showing the various operations to be performed under the Contract and the value of each operation, in accordance with Article 41 of the Standard Construction Contract. The Contractor shall also submit such other information relating to the bid breakdown as directed by the Resident Engineer.

B. Logic and Duration Schedule: See Section 01 32 10 – Progress Scheduling for a definition of the term and details of what it requires.

C. Work Result: Permanent or temporary aspect of a construction project achieved in the production stage or by subsequent alteration, maintenance or demolition processes, through the application of a particular skill or trade to construction resources.

1.05 DESCRIPTION

A. The SOV shall be developed in parallel and in coordination with the development of the Logic and Duration Schedule in accordance with the requirements of Section 01 32 10 – Progress Scheduling

B. Partial payments, in accordance with Article 42 of the Standard Construction Contract, will be determined from the Final SOV.

C. Preliminary Schedule of Values

1. The preliminary SOV shall include, as a minimum, the proposed values estimated by the Contractor for the Work of the Contract which shall be indicated in Table 1 – Preliminary SOV attached to this Section.

2. The Contractor and Engineer shall meet and jointly review the preliminary SOV and make adjustments in value allocations if, in the opinion of the Engineer, these are necessary to establish fair and reasonable allocation of values to the Work spread over the term of the Contract. Unbalanced allocations weighted towards the commencement of the Contract term or a specific Contract item will not be permitted. Within 14 days of joint review, Contractor shall submit revised SOV for DEP approval. The Engineer shall review and approve (or return for any necessary revisions) within 14 days from the date of the resubmittal.

D. Final Schedule of Values

1. The minimum required detail of breakdown of the Work of this Contract is indicated in Table 2 – Final Schedule of Values attached to this Section. This list is not intended to be an exhaustive list of work to be performed or

items to be installed. Greater detail shall be provided if requested by the Engineer.

2. Approved change orders reflected in the Logic and Duration Schedule shall each be incorporated by the Contractor into the SOV as a single unit identified by the change order number. Depending on the magnitude and duration of the change order work, the unit may require further breakdown for payment as required by the Engineer. The Contractor shall resubmit within 14 days of Change Order approval. The Engineer shall review and approve submission (or return for any additional revisions) within 14 days of receipt of revised SOV.

E. Cross Reference Listing

1. The Contractor shall furnish a cross reference listing in two (2) parts. The first part shall list each scheduled activity with the breakdown of the respective valued items making up the total cost of the activity. The second part shall list the valued item with the respective scheduled activity or activities that make up the total cost indicated. These listings shall be updated and submitted in conjunction with the Logic and Duration Schedule monthly submittals as specified in Section 01 32 10 – Progress Scheduling.

F. Changes to the Schedule of Values

1. Changes to the Logic and Duration Schedule which add activities not included in the original schedule, but included in the original scope of Work (schedule omissions or errors) shall have values assigned in the SOV as approved by the Engineer. Necessary revisions will incorporate the Cross Reference Listing.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Preliminary Schedule of Values

1. The Contractor shall submit a preliminary SOV for the Engineer's approval within 15 days of the commencement date given in the Notice to Proceed.

B. Final Schedule of Values

1. The Contractor shall prepare and submit a final SOV to the Engineer within 90 days of the commencement date given in the Notice to Proceed. The final SOV shall be based on the accepted preliminary SOV for major Work and it must be in sufficient detail to determine monthly progress payments related to the Work performed as shown in the monthly progress schedule update. The Engineer shall be the sole judge of acceptable SOV figures, details and description of the values established. If, as directed by the Engineer, a greater number of items is required, the Contractor shall

add the additional items to the SOV and resubmit within 14 days of notification. The Engineer shall review and approve submission (or return for any additional revisions) within 14 days of receipt of revised SOV.

C. Cross Reference Listing

1. A cross reference listing shall be submitted as specified herein, in order to assist in the correlation of the SOV, proposed monthly cash flow (per Article 9 of the New York City Standard Construction Contract), and the Logic and Duration Schedule.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

TABLE 1
PRELIMINARY SCHEDULE OF VALUES
(Major Work Results)

I. CONTRACT CAT-475

1. LS-1 Mobilization
2. LS-2 Work Result
    a. Area/Process/Location
        i. Existing Conditions (Division 02) to Water and Wastewater Equipment (Division 46) as required
3. LS-3 De-Mobilization

TABLE 2
FINAL SCHEDULE OF VALUES
(Minimum Detail Required for Contract CAT-475)

I. Lump Sum 01 (LS-1) - Mobilization

II. Lump Sum 02 (LS-2) – Work Result

a. Area/Process/Location

1. Existing Conditions.....Div. 02
   a. Detailed Work Results as required
2. Concrete .....Div. 03
   a. Detailed Work Results as required
3. Masonry .....Div. 04
   a. Detailed Work Results as required
4. Metals.....Div. 05
   a. Detailed Work Results as required
5. Thermal and Moisture Protection .....Div. 07
   a. Detailed Work Results as required
6. Openings .....Div. 08
   a. Detailed Work Results as required
7. Finishes .....Div. 09
   a. Detailed Work Results as required
8. Specialties .....Div. 10
   a. Detailed Work Results as required
9. HVAC .....Div. 23
   a. Detailed Work Results as required
10. Electrical .....Div. 26
    a. Detailed Work Results as required
11. Electronic Safety and Security.....Div. 28
    a. Detailed Work Results as required
12. Earth Work.....Div. 31
    a. Detailed Work Results as required
13. Exterior Improvements .....Div. 32
    a. Detailed Work Results as required
14. Process Interconnections.....Div. 40
    a. Detailed Work Results as required
15. Material Processing and Handling Equipment .....Div. 41
    a. Detailed Work Results as required
16. Water and Wastewater Equipment.....Div. 46
    a. Detailed Work Results as required

(Minimum Detail Required for Contract CAT-475)

III. Lump Sum 03 (LS-3) – De-Mobilization

NO TEXT ON THIS PAGE

SECTION 01 31 10 – PROJECT PARTNERING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Prime Contractor(s) shall participate in "project partnering" along with DEP and its consultants for this project. Each Prime Contractor should also include its major subcontractors and suppliers in partnering so that these participants may "buy-in" to the concept and work cooperatively with other parties on the project.

B. Partnering is considered by DEP to be important to the overall success of this project. It is also important to this project that the Contractor(s) be equally concerned with safety, quality, performance, budget, and schedule and that they will endorse and adopt Partnering as an effective tool for achieving these objectives.

C. Partnering will be effective only if all parties willingly and enthusiastically enter into this cooperative arrangement which is supported by each entity at the highest level in their organizations.

D. Project partnering and goals;

E. Initial workshop and follow-up;

F. Partnering Facilitator and project charter.

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. "Partnering" refers to the team-building required to create mutual trust among the prime contractor(s), subcontractors, representatives of DEP and its consulting firms, and other stakeholders in a construction project, and respect for one another's roles in the project and recognition of the risks inherent in those roles, so that all members of the team (participants) become partners in executing and completing the Work. As a minimum, the participants shall include the following entities in addition to the prime contractor(s) and their subcontractors:

1. The Bureau of Engineering Design & Construction (BEDC), which will represent DEP in the project at all times during the period of the project unless otherwise specified herein.
2. The DEP Bureau or Bureaus which are responsible for operating and maintaining the existing or new facility where the project is to take place.
3. The consulting firm or firms, if applicable, which are hired by DEP to design the construction project, including the preparation of the Drawings and Specifications.
4. The consulting firm or firms, if applicable, which are hired by DEP to manage the construction project.

B. The Partnering "Facilitator" is the mutually agreed upon professional selected to initiate the Partnering effort and assist with the Partnering workshops and other activities as specified herein and as required.

1.05 DESCRIPTION

A. Project Partnering & Goals

1. To be successful, this project must achieve the following goals:
   a. Construction meets the project performance standards as defined in the Drawings and Specifications;
   b. Completion of the project on schedule; and
   c. Conformance to budgetary requirements and limitations.
2. Safety, profit, liability limitation, avoidance of litigation, reputation, good will, and other factors are also of significant importance to participants involved in the project.

3. Through Partnering, the participants will agree among themselves as to the primary goals for the project and the methods that will be used to accomplish them. This will require development of a trust relationship, not an adversarial one, among these parties who will be working closely and cooperatively for the duration of the project.

4. Commitment, communication and conflict resolution must be of highest importance for this relationship to succeed. The parties mutually will develop a communication framework and a procedure for addressing conflicts that may arise during the performance of the Work.

   a. Nothing in this Section shall change or modify any other provisions of the Contract.

B. Initial Workshop & Follow-Up Meetings

1. The Contractor shall hold an initial workshop and conduct follow-up meetings, as required under this Article, to facilitate Project Partnering.

2. Initial Workshop: Partnering will include an initial workshop in which the basic requirements for the Partnering relationship will be established. The workshop will be held within 30 days of issuance of the Notice to Proceed (NTP) at a time and date agreed upon by all parties at the site of the work or a mutually agreed upon location. Attendees at the Partnering workshop shall typically include:

   a. Contractor(s)/subcontractors Representatives:

      1) Project Director;

      2) Project Manager; and

      3) Superintendent.

   b. DEP Representatives:

      1) Assistant Commissioner(s);

      2) Director(s);

      3) Operating Bureau Chiefs;

      4) Portfolio Manager;

      5) Design; Liaison

      6) Accountable Manager; and

      7) Engineers

   c. Construction Management (CM) Consulting Firm Representatives:

      1) Project Director;

      2) Project Manager; and

      3) Engineers.

d. Design Engineering Consulting Firm Representatives:

1) Project Director;

2) Project Manager; and

3) Engineers

3. Follow-up Meetings: Quarterly half-day Partnering sessions shall be held throughout the project in order to confirm the relationship and assure the Partnering effort continues to be successful. The intent of the on-going sessions is to maintain communication between the key parties and to resolve higher order issues that require decisions at the executive level and areas for improvement. It is not meant to replace the routine project progress meetings or the normal flow of the project.

C. Partnering Facilitator & Project Charter

1. The Contractor shall employ a Partnering Facilitator who will help establish and monitor the Partnering relationship. The Contractor shall pay all costs associated with employing the Partnering Facilitator.

2. The Partnering Facilitator shall initiate the Partnering effort and conduct the Partnering workshops. The Contractor shall pay all costs for facilities used to conduct the workshops.

3. Selection of the Facilitator

a. As soon as practicable after award of the Contract, the City and the Contractor(s) shall meet to discuss the establishment of the formal Partnering process.

b. The Contractor shall propose up to three (3) candidates to select from as Partnering Facilitator.

c. The City and the Contractor(s) shall mutually select one (1) of the three (3) candidates to be the Facilitator.

4. The Facilitator shall develop a project Charter with input from all parties. The Charter shall include, but not be limited to:

a. Statement of goals and objectives for the construction project;

b. Identification of all project participants and descriptions of their roles in the project;

c. The procedures for communicating both normal progress of Work and any barriers to meeting project goals and objectives;

d. A process for resolving conflicts that may arise during the performance of Work. This process is not intended nor shall it be deemed to affect or replace the dispute resolution process set forth in Article 27 of the Standard Construction Contract.

1.06 QUALITY ASSURANCE

A. The Facilitator shall be trained in the recognized principles of Partnering by an accredited institution such as the International Partnering Institute, Associated General Contractors of New York State, or possess equivalent qualifications as determined by DEP.

B. The Facilitator shall have the following professional experience and qualifications:

1. At least five (5) years' experience in Partnering facilitation with a demonstrated track record, including public sector construction; and,

2. Skill set that includes some or all of the following; construction management, negotiations, labor management mediation, and/or human relations.

1.07 SUBMITTALS

A. Within 30 days after the NTP, the Contractor shall provide the resumes of the proposed candidates to select from as Partnering Facilitator containing their full names, contact information, and the following verifiable information:

1. Certification or training;

2. Experience and qualifications;

3. Past facilitation participation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 31 15 – PROJECT COORDINATION
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor Cooperation

B. Coordination Drawings

C. Final Coordination Drawings

D. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Installation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 – Progress Scheduling

B. Section 01 35 27 – Environmental, Health and Safety Requirements

C. Section 01 35 45 – Hazardous Materials Control

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Contractor Cooperation

1. The Contractor shall not interfere with DEP or its contractors, consultants, or agents from entering the Work Site for the purpose of constructing, operating, maintaining, removing, repairing, altering or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the Work. The Contractor shall cooperate with all the aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the City, or others, to be done in connection with the Work, or in connection with normal use of the facilities.

2. The Contractor shall cooperate fully with the City, the Engineer, and Other Contractors employed on the Work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. To the extent possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.

3. The Contractor is advised that, as stated in Section 01 11 00 – Summary of Work, other construction contracts near or at the Project Site may be in progress on the starting date of this Contract or will be started while this Contract is in progress. The Contractor shall cooperate with the contractors for these other contracts as outlined in Article 18 of the General Conditions to ensure that the work under these other contracts is not impeded or interfered with by Contractor's own activities. Any disagreements with these other contractors shall be brought to the immediate attention of the Engineer, whose judgment as to the resolution of the disagreement shall be final, binding, and conclusive.

   a. At the request of the Engineer, the Contractor shall allow bidders for these other contracts to inspect the site, take samples and make investigations related to the preparation of their bids.

   b. The Contractor is advised that other contractors may be invited by the City to join City personnel to receive training from the Contractor in the operation and maintenance of equipment furnished and installed under this Contract. The Contractor shall provide this training to the personnel of both the City and the other contractors in accordance with the requirements of Section 01 79 05 - Equipment Start-Up and Training.

4. The CAT-475 Contractor shall be responsible for maintenance of the existing roads, drainage swales, and sediment traps/facilities regardless of the status of the CAT-212E contract.

1.06 QUALITY ASSURANCE

A. Work on Coordination Drawings

1. All Work on the Coordination Drawings shall be performed in a clear, legible manner. The Engineer shall be the sole judge of the acceptability of the Coordination Drawings.

B. All changes in the Work on any Contract, whether a change in price is given or not, shall be shown on the Coordination Drawings.

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 31 19 – PROJECT MEETINGS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	1
1.06	Submittals	3
1.07	Delivery, Storage, and Handling	3
1.08	Spare Parts, Special Tools, and Supplies	3
1.09	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Project Meetings

1. The Contractor shall attend Project meetings, including but not limited to the following:

a. Pre-construction Meeting

1) Upon receipt of a copy of the Notice to Proceed, or at an earlier time if agreeable to the Contractor, the Engineer will arrange a pre-construction meeting. Attendees shall include: the Contractor's project representative authorized to act on behalf of the Contractor and to direct the performance of Work by the Contractor's employees and agents; the Contractor's superintendent; major subcontractors; the Engineer; DEP representatives; and others involved in the execution of the Work.

2) The purpose of this meeting will be to establish a working relationship and understanding between the parties and to discuss project organization, job communications, construction schedule, submittals and processing, Schedule of Values, payment procedures, Extra Work procedures, safety requirements, permits and inspections, and such other subjects as may be pertinent for the execution of the Work.

3) A schedule of regular meetings will be established at the Pre-construction meeting.

b. Monthly Status Meetings

1) Upon commencement of Work at the Site or earlier as directed by the Engineer, the Contractor shall attend the project status meetings on a monthly basis (or as required by the Engineer). The Engineer will arrange and conduct these meetings and will prepare and circulate an agenda for each meeting. A representative of the Contractor approved by the Engineer shall attend these meetings.

2) The status of outstanding submittals will be reviewed to determine anticipated dates of any submittals yet to be provided, and the status of those submittals under review by DEP. The status and progress on resolving any outstanding requests for change orders. The status of any other items that could have a significant impact upon the course of the Work will also be reviewed and discussed.

c. Monthly and CPM Progress Meetings: These meetings shall be carried out in accordance with Section 01 32 10 – Progress Scheduling.

d. EHS Coordination Meetings: These meetings shall be carried out in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

e. Special Coordination Meetings

1) During the course of performing the Work, attend special coordination meetings in advance of commencing certain work activities as specified or directed by the Engineer, including but not limited to the following:

a) Specific requirements for coordination meetings are included in Section 01 35 45 – Hazardous Materials Control.

2) DEP will determine the need for additional special coordination meetings and convene such meetings with written notice to the Contractor.

3) The Contractor shall attend and participate in these special coordination meetings at no additional cost to the City.

2. Contractor Representation

a. A Contractor's project representative shall be required to attend all meetings scheduled by the Engineer, as set forth above.

b. If the Contractor's project representative fails to attend two scheduled meetings without prior approval, the Contractor will be directed to replace the current Contractor's project representative. Further incidents of non-attendance by the Contractor's project representative will form the basis for review of the Contractor's PASSPort performance evaluation.

B. Quality Assurance

B. Not Used.

1.06 SUBMITTALS

A. Not Used

1.07 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.08 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.09 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 31 25 – WEB BASED PROJECT MANAGEMENT INFORMATION SYSTEM
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for the Contractor's use of DEP's web-based Enterprise Project Management Information System ("EPMIS" or "the System") to manage all Project communications, workflows and document submittals.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Implementation	6
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 – Progress Scheduling

B. Section 01 33 00 – Submittal Procedures

C. Section 01 78 42 – Records in Electronic Formats.

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Use and Operation of the System:

1. The Contractor shall utilize EPMIS for electronic submittal of all data and documents throughout the duration of the Contract.

2. The System is required for use by all participants in the Project including DEP, the Construction Manager, Engineer, Contractor, and all other users authorized by DEP.

3. The System will operate primarily on an Trimble (www.e-builder.net) platform that will be administered by DEP and the Construction Manager. Joint use of the System will facilitate electronic exchange of information, automation of key processes, and overall management of the Contract.

4. The System shall be the primary means of Project information submission and management. When required by DEP or its representatives, paper documents shall also be provided.

B. User Access Limitations and Data Ownership

1. DEP, the Construction Manager and the Engineer will control access to the System by allowing access and assigning user profiles to authorized Contractor and Project personnel. User roles will define levels of access to the System, and determine assigned role-based authorizations and user privileges. Subcontractors and suppliers will be given access to the System through the Contractor. Entry of information exchanged and transferred between the Contractor and its Sub-contractors and suppliers through the System shall be the responsibility of the Contractor.

2. Secure username and password will be required for controlled access to the System for all authorized participants via a web URL address. The Contractor shall designate its staff to be granted access to the System.

3. Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the System) by DEP and its representatives and the Contractor will be owned by DEP.

C. Automated System Notification and Audit Log Tracking

1. Any review comments made (or the failure to make review comments) by DEP and its representatives on Contractor-submitted documentation shall not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. The City's acceptance through automated System notifications or audit logs extends only to the fact that

the documentation was submitted and does not constitute substantive approval of the Contractor's submitted information.

D. Computer Requirements

1. The System will have a minimum bandwidth of 4MB/s download and 1MB/s upload. A faster connection is recommended (1.5MB per concurrent user should be used as a planning factor) and may be used, but uploading time considerations by the Contractor when uploading pictures and files to the System shall be based on the bandwidth defined herein.

2. Once implemented on the project, if the System does not meet its minimum performance standards, as listed below, the Contractor shall make the corrections necessary to its computers or network until the standards are met.

3. The required minimum EPMIS performance standards, and the higher, recommended levels of performance, are as follows:

   a. File download speed

      1) One (1) second per MB of data recommended (e.g., one (1) 20MB file should download in less than 20 seconds)

      2) Five (5) seconds per MB of data minimum (e.g., one (1) 20MB file must download in less than 100 seconds)

   b. File upload speed

      1) One (1) second per MB of data recommended (e.g., one (1) 20MB file should upload in less than 20 seconds)

      2) Five (5) seconds per MB of data minimum (e.g., one (1) 20MB file must upload in less than 100 seconds)

4. The Contractor shall use computer hardware and software that meets the requirements of the System. Computers shall be less than three (3) years old. As recommendations are modified by the System provider, the System will be upgraded to meet those recommendations or better. Any need for upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract.

5. The Contractor shall ensure that its authorized System users have access to the public internet from a computer system running a currently supported Microsoft Windows operating system and Microsoft Edge web browser. The connection to the internet should be high speed (broadband) as described under “Computer Requirements,” above. The Contractor shall ensure that anti-virus and anti-malware software is installed and maintained on all computers given access to EPMIS.

E. Contractor Responsibilities

1. The Contractor shall be responsible for the validity of its information placed in the System and for the abilities of its personnel to use the System. Accepted users shall be knowledgeable in the use of computers, including internet browsers, email programs, CAD and Revit drawing applications, and Adobe portable document format (PDF) document conversion programs. The Contractor shall utilize the existing forms and processes in the System to the maximum extent possible. If an additional form is required that does not exist in the System, the Contractor shall request approval to develop such form or for one to be provided by DEP. Adobe PDF documents will be created through electronic conversion rather than optically scanned. The Contractor, in coordination with the Construction Manager, is responsible for the training of its personnel in the use of the System (beyond what is provided by DEP) and of the other programs indicated above, as needed.

2. DEP owns EPMIS, and will provide initial training and rollout services after Contract award. DEP will provide overall System administration during the Contract period. The Construction Manager will have a System administrator for the project with limited System administration support responsibilities, including ongoing training of the Contractor team.

3. The Contractor shall provide a list of its key personnel designated for access to the System for the City's approval. The Contractor is responsible for timely notifying the City and the Engineer of any changes in personnel that require adding or removing authorized users from the System. DEP reserves the right to perform a security check on all potential users. The Contractor may be given the rights to provide System access to additional personnel or Subcontractors.

4. The System user license fees will be paid by DEP.

F. Connectivity

1. EPMIS is a web-based environment and therefore subject to the inherent speed and connectivity problems of the internet. The Contractor is responsible for its own connectivity to the Internet. The System's response time is dependent on the equipment used to access it, including processor speed, internet access speed, etc. and current traffic on the internet. The City will not be liable for damages resulting from any delays associated with the use of the System including, but not limited to: slow response time, downtime periods, connectivity problems, or loss of information. Moreover, such delay shall not be deemed a sufficient basis for a time extension of or cost adjustment to the Contract.

G. Training

1. DEP, through the System vendor or the System vendor's qualified representative, will provide on-site training in the use and functionality of the System. Training sessions will be provided for employees of the

Construction Manager, Engineer, the City, and the Contractor. Each training session will be for a duration of eight (8) hours. The Contractor shall have two (2) qualified persons attend the training. One (1) refresher training session will be provided upon request.

1.06 QUALITY ASSURANCE

A. All Contractor representatives participating in workflows and EPMIS processes (e.g. RFIs, submittals, Non Conformance Reports, etc.) shall have a minimum of three (3) years of experience in the use of Microsoft Word and Excel. The Contractor's Document Control Specialist shall be experienced and trained in the use of entering and monitoring documentation into a web-based document management system, e.g., Trimble, Meridian Prolog, Oracle-Primavera Contract Manager, or an equivalent system. The Document Control Specialist shall be knowledgeable of the status of all Contract documentation aspects of the work throughout the term of the Contract.

1.07 SUBMITTALS

A. Within thirty (30) calendar days of issuance of the Notice to Proceed, the Contractor shall submit for approval by the Engineer a list of the Contractor's and its Subcontractors' key personnel who have been designated to have access to the System. The list shall include descriptions of the designated individual's roles and responsibilities for this Project. The Contractor should also identify its organization's System administrator on the list.

B. The Contractor shall submit the name and qualifications of its designated Document Control Specialist. Any change in the individual serving as Document Control Specialist shall be submitted to and coordinated with the Construction Manager.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. System Utilization

1. The System shall be utilized in connection with all submittal preparation and information management required under this Contract. Requirements contained in this Article are in addition to the applicable submittal and documentation requirements of other Sections of the Specifications, including without limitation, Section 01 33 00 – Submittal Procedures and Section 01 78 42 – Records in Electronic Formats.

2. All submittals detailed in design drawings and related specifications shall be submitted by the Contractor as CAD or Revit files (in .dwg or .rvt format) and PDF files through the System submittal workflow process.

3. Shop Drawing and design data documents shall be submitted as CAD or Revit files (in .dwg or .rvt format) and PDF files through the System submittal work flow process. Examples of Shop Drawings include, but are not limited to:

   a. Standard manufacturers' installation drawings;

   b. Drawings prepared to illustrate portions of the Work designed or developed by the Contractor;

   c. Steel fabrication, piece, and erection drawings; and

   d. Piping layout.

4. Product catalog data and manufacturers' instructions shall be submitted as PDF files through the System submittal workflow process. The PDF files should be the original, searchable PDF files from the manufacturer and not scanned files which are not searchable. Examples of product data include, but are not limited to:

   a. Manufacturers' printed literature;

   b. Preprinted product specification data and installation instructions.

5. All correspondence and pre-construction administrative submittals shall be submitted using the System. Examples of administrative submittals include, but are not limited to the following:
   a. Digging permits and notices for excavation;
   b. Requests for Deviation (RFDs) for product substitutions;
   c. List of contact personnel;
   d. Notices for roadway interruption, Work outside of Normal Project Working Hours, and utility cut overs;
   e. Requests for Information (RFIs);
   f. Network Analysis Schedules and associated reports and updates;
   g. Each schedule submittal specified in Section 01 32 10 – Progress Scheduling shall be submitted as a native backed-up file (.PRX or XER) of the scheduling program being used. The schedule will also be posted as a PDF file in the format specified in Section 01 32 10 – Progress Scheduling.
   h. Plans for safety, demolition, environmental protection, and similar activities;
   i. Quality control plan(s), testing plan and log, quality control reports, production reports, quality control specialist reports, preparatory phase checklist, initial phase checklist, field test reports, summary reports, rework items list, etc.;
   j. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.;
   k. Any general correspondence submitted.
6. Compliance submittals such as test reports, certificates, and manufacturer's field report submittals shall be submitted through the System as PDF attachments. Examples of compliance submittals include, but are not limited to:
   a. Field test reports;
   b. Quality control certifications;
   c. Manufacturers' documentation and certifications for quality of products and materials provided.
7. Record submittals such as operation and maintenance data and closeout submittals shall be submitted through the System as PDF documents during the approval and review stage as specified, with a hard copy (paper) set of documents submitted for final. Examples of record submittals include, but are not limited to:

a. Operation and maintenance manuals: final documents shall be submitted as specified;

b. As-Built Drawings: final documents shall be submitted as specified;

c. Extra materials, spare stock, etc.: submittal forms shall indicate when actual materials are to be submitted;

8. Financial submittals, such as Schedule of Values, pay estimates and change order request proposals, shall be submitted through the System. Supporting material for pay estimates and change order requests shall be submitted through the System as PDF attachments. Upon acceptance of corrected "pencil copies" of payment estimates, hard copies shall be submitted for processing. Examples of financial submittals include, but are not limited to, the following:

a. Contractor's Schedule of Values;

b. Contractor's monthly progress payment requests;

c. Contract change order proposals requested by the City; and

d. Value Engineering Proposals (VEP) and related documentation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 32 10 – PROGRESS SCHEDULING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. CPM and Project Schedule Software
2. Work Breakdown Structure (WBS)
3. Activities and Activity Code Structure
4. Sequence and Interdependence of Work Activities
5. Project Calendars
6. Activity Labor and Resource Data
7. CPM Progress Meeting and Reports
8. Remedial Measures and Recovery Schedule
9. Exhibit 1 - Work Breakdown Structure
10. Exhibit 2 - Activity ID Format
11. Exhibit 3 – Schedule Milestones
12. Exhibit 4 – Proposed Activity Codes
13. Exhibit 5 – Project Calendars

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	9
1.07	Submittals	10
1.08	Delivery, Storage, and Handling	19
1.09	Spare Parts, Special Tools, and Supplies	19
1.10	Warranty	19
PART 2	PRODUCTS	19
2.01	Manufacturers	19
2.02	Materials / Equipment	19
2.03	Fabrication / Assembling / Finishes	19
2.04	Source Quality Control / Shop Tests	19
PART 3	EXECUTION	19
3.01	Examination / Preparation	19
3.02	Implementation	19

3.03 Field Testing / Quality Control 19
3.04 Startup / Demonstration 19
3.05 Adjusting / Protection / Cleanup.....19

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Activity - A representation of a discrete portion of the overall scope of Work or an event through Duration and description.

B. Baseline Construction Schedule - The planned, detailed Critical Path Method (CPM) schedule of activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work, which has been accepted by DEP.

C. Critical Path Method (CPM) - A management technique used to plan and control a project which combines all relevant information into a single plan defining the sequence and duration of operations, and depicting the interrelationship of the Work elements required to complete the project. The critical path is defined as the longest sequence of activities in a network which establishes the minimum length of time for accomplishment of the end event of the project.

D. Current Construction Schedule - The most recently updated schedule that captures progress to date and forecasts the Early Start/Early Finish for each Activity and the remaining cash flow, depicted with the open bar chart activity line with corresponding schedule dates shown.

E. Data Date - The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.

F. Duration - The amount of time, in workdays, an Activity will take to perform once begun and continuously performed until complete.

G. Early Finish - The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.

H. Early Start - The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.

I. Float - The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship.

J. Fragnet - Fragmentary network: a portion of the project schedule detailing impacts of an event on specific Activities in the broader schedule.

K. Late Finish - An estimate of the latest plausible date an Activity's completion can be postponed until without rendering as unachievable the required completion of any downstream milestones to which the Activity is Logically connected to in a progressive relationship.

L. Late Start - An estimate of the latest plausible date an Activity's start can be postponed until without rendering as unachievable the required completion of any downstream milestones to which the Activity is Logically connected to in a progressive relationship.

M. Logic - A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.

N. Original Duration - The estimated amount of time, in workdays, an Activity is expected to take to complete at the beginning of a project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Construction Schedule.

O. Percent Complete - The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated by dividing the progress earned by the budgeted value.

P. Remaining Duration - The amount of time, in workdays, the remaining scope of Work represented by an Activity is expected to take to complete at the current Data Date

Q. Resource and Cost Loading - Values assigned for estimated manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.

R. Total Float - The amount of time the start or finish of an Activity can be delayed without affecting the project completion date.

S. Work Breakdown Structure (WBS) - A deliverable-oriented decomposition of a project into smaller components. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.

1.05 DESCRIPTION

A. CPM & Project Schedule Software

1. Critical Path Method – The CPM type construction schedule will be used to monitor Contract progress. The Contractor shall be responsible for providing all information concerning the sequencing, Logic and Duration of all Activities as well as providing the electronic schedule file produced

in the Primavera Project Management (.xer) format. Once the initial Baseline Construction Schedule is accepted by the Engineer, the Contractor shall be responsible for preparing and submitting monthly update information regarding schedule Logic, physical Percent Complete, actual start and finish dates, duration changes to actualized activities, added Activities, change orders and related reports and schedules, including the updated Primavera Project Management (.xer) format electronic file.

B. Work Breakdown Structure (WBS)

1. WBS is a deliverable-oriented decomposition of a project into smaller components. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. The WBS depicted in **Exhibit 1**, attached to this Section, reflects the minimum structure needed for reporting and the Contractor is expected to define and add additional lower levels as needed.

C. Activities

1. Activities included in the CPM schedule shall be of sufficient detail to assure adequate planning and execution of the Work, such that, in the judgment of the Engineer, it provides an appropriate basis for forecasting, monitoring and evaluating the progress of the Work.

a. Activities shall conform to the following requirements:

1) Subdivide the total scope of Contract Work into Activities of Duration no longer than twenty working days each, except as to non-construction activities (such as purchase of materials, delivery of materials, delivery of equipment and concrete curing) and any other Activities for which the Engineer may approve longer Duration. The Duration of the Activities representing the Engineer's approval of items such as shop drawing submittals, drawing submittals, requests for manufacturer approval, requests for Subcontractor approval, etc. shall not be less than twenty-one calendar days but may be longer if the detail and complexity of the submittal warrant.

2) The construction time as determined by the CPM schedule from Early Start to Late Finish for any sub phase, phase or the entire project shall not exceed the Contract time specified or shown in the Contract Documents.

3) One day shall be the smallest time unit shown unless otherwise directed by the Engineer.

4) Activity descriptions shall contain consistent terminology such that the scope of Work represented is readily identifiable for assessment of completion.

5) Activities labeled "start," "continue," or "complete," will not be allowed. Lead and lags are not acceptable.

6) Show the following on each Activity, as directed by the Engineer:

a) Activity number consistent with Engineer's provided template and in accordance with **Exhibit 2**, attached to this Section.

b) Complete (self-explanatory) description of the Work represented by the Activity stated in a verb, noun, and location format.

c) Duration in days.

d) Labor hours required to accomplish scope represented by the Activities. Labor hours are to include all direct labor, by trade, required for Activities representing construction.

e) Physical quantity of material to be installed (cubic yard of concrete, linear feet of pipe, etc.) for items directed by the Engineer and in accordance with this Section.

f) Other Activity coding as directed by the Engineer to define the Activity's scope, constraints, responsibility or other requirements.

g) Completed coding and organization of data and schedule information in accordance with the Activity Code Structure requirements provided in this Section and approved by the Engineer.

2. All Activities, with the exception of the Notice to Proceed (NTP) and Substantial Completion, shall have a predecessor and successor. No open-ended Activities will be permitted.

3. The construction schedule shall contain Activities representing contractual and non-contractual milestones as designated by the Engineer and detailed in **Exhibit 3**, attached to this Section.

D. Activity Code Structure

1. Activity codes proposed for scheduling Work progress under the Contract are shown on **Exhibit 4**, attached to this Section.

2. Activity codes should be defined as project Activity codes, not global Activity codes.

3. The Contractor shall break the Work into Activities in accordance with the specified coding structure and in accordance with the Contract Drawings

and Specifications. The selection of Activities and the coding structure shall be subject to the review and acceptance by the Engineer.

4. The coding shall follow the designation conventions outlined above and shall include identification of subcontractors, suppliers/vendors and fabricators, and other parties reporting to the Contractor.

   a. The Contractor is required to develop other Activity codes and values needed to comply with the reporting requirements listed in this Section, subject to acceptance by the Engineer.

5. The Engineer will provide the Contractor with a system of identification numbers that shall be used for CPM schedule numbering system and project coding. Additional coding required by the Contractor may be added to the network to supplement that supplied by the Engineer.

6. Activity IDs will conform to the format detailed in **Exhibit 2**, attached to this Section, or as directed by the Engineer.

E. Sequence and Interdependence of Work Activities

1. The CPM schedule shall indicate the Logic of Activities. It shall include, but not be limited to, the following items as appropriate to the Contract:

   a. Contractor working drawing preparation and review by the Engineer;

   b. Materials, Equipment, and Systems:

      1) Vendor submittal/approval;

      2) Shop drawing submittal/approval;

      3) Release for fabrication;

      4) Fabrication period;

      5) Witness shop test;

      6) Delivery;

      7) Installation;

      8) Preliminary test;

      9) Final test;

      10) Operation and Maintenance (O&M) manuals submittal/approval;

      11) Equipment training plans and procedures submittal/approval;

      12) Equipment training;

      13) Systems training plans and procedures submittal/approval;

      14) Systems training.

   c. Shop and field performance tests and supervisory service Activities;

d. Mobilization and move-in;

e. Preparing and coordinating drawings;

f. Obtaining all required permits;

g. Inspections;

h. Specific Work activities, such as, but not limited to:

1) Sitework;

2) Underground piping;

3) Electrical ductbanks;

4) Structural excavation;

5) Soil testing;

6) Backfill;

7) Placement of sheeting;

8) Pile driving;

9) Formwork erection;

10) Rebar placement;

11) Placing of concrete;

12) Stripping forms;

13) Concrete curing;

14) Installation of process piping and valves;

15) Electrical conduits and wiring;

16) Instrumentation and controls conduits and wiring;

17) Terminations;

18) Maintenance and exercising activities;

19) Other materials and plant equipment;

20) Cleanup.

i. Construction of all facilities outlined in the Contract Documents;

j. Subcontractors' items of Work;

k. Time allowance for inclement weather per National Oceanographic and Atmospheric Administration (NOAA) information for local area;

l. Delivery, installation, and check out/testing of City-supplied equipment;

m. Time allowance for checkout and startup;

n. Contract coordination with Other Contractors, substantial completion and final completion dates and maintenance of existing operations;

o. Indicate all coordination activities from related construction contracts;

p. Interruption and shut down requests of plant utilities to allow for new connections;

q. Connection to all existing plant systems and equipment;

r. Preparation of final copies of Contractor working drawings;

s. Specific information required by or from the Engineer;

t. All temporary utilities and construction;

u. Required inspections by the Contractor or Engineer;

v. Submittal of Contract record drawings at project completion, or as directed by the Engineer.

F. Project Calendars

1. All Activities should have a project calendar assigned, not a global calendar. This allows the calendars to easily travel with the project when exported and more importantly, when imported.

2. Each calendar should also identify all other days considered non-work days, including but not limited to observed holidays.

3. Each calendar should be adjusted for months beginning in the year of NTP and lasting three years beyond the Contract completion date.

4. Each calendar should be named @-### _X, where @-### _ represents the project and X summarizes the nature of the calendar. Typically, the number of days per week. See examples in **Exhibit 5**, attached to this Section.

G. Activity Labor and Resource Data

1. The Contractor shall accurately labor load by craft or trade all Activities requiring direct field labor. All labor loading shall be in hours. At the direction of the Engineer, and at no additional cost to the City, the Contractor may be required to include additional resource loading, such as, but not limited to, major pieces of construction equipment, in order to track major critical Activities and measure progress.

2. When required by the Engineer, and at no additional cost to the City, the Contractor shall accurately quantity load specific Activities or groups of Activities. The quantity amount shall equal the total quantity to be installed for each specific Activity. Quantity loading may be required for major Activities with Durations dependent on daily production, such as mass excavation – cubic yards, piling – linear feet of piles, concrete formwork – square feet of forms, concrete pours – cubic yards of concrete, piping

installation – linear feet of pipe, electrical duct banks – linear feet, electrical conduit and wire – linear feet, terminations – number of terminations, etc.

3. All resource loading shall be coded to the Contract identifier under a "root." Since resource loading cannot be project-specific, this root heading is needed to keep the database segregated.

1.06 QUALITY ASSURANCE

A. The Contractor shall retain a CPM scheduling consultant or utilize its own qualified CPM scheduler in lieu of a CPM consultant, to develop and maintain the update of the CPM schedule plan for the Work for the duration of the Contract. This consultant, along with the Contractor, is expected to work closely with the Engineer to deliver acceptable work products as outlined in this Section. The purpose of this Section is to expand and further clarify the requirements for the CPM schedule under Article 9 of the Standard Construction Contract.

B. Within seven days after the NTP, the Contractor shall submit the qualifications of the proposed CPM scheduler for review and approval.

1. The Contractor may submit to the Engineer for approval a written request to provide its own qualified CPM scheduler or a CPM consultant. In the case of a Contractor's scheduler, the Contractor is responsible for performing all activities described in this Section as being performed by the CPM consultant.

2. If, after approval, the Engineer determines that the Contractor's scheduler or scheduling consultant is unable to adequately perform the CPM requirements of this Specification, the Engineer will require the Contractor to provide a new qualified CPM consultant at no additional cost to the City.

C. Upon NTP, the Contractor shall meet with its CPM scheduling consultant at least weekly for the purpose of developing the information required by this Section. These meetings will continue until a minimum status of "Accepted" has been achieved on the Baseline Construction Schedule.

D. The Contractor will be required to coordinate its scheduling of Activities with the CPM scheduling consultant. If, in the judgment of the Engineer, the Contractor is deemed uncooperative in providing the required information to the CPM scheduling consultant necessary to develop the preliminary CPM, Baseline Schedule, or monthly schedule updates, then the Engineer may withhold partial payments or a portion thereof.

E. The monthly CPM schedule update payment item for any specific month will not be earned until the Contractor submits the required monthly CPM progress schedule. In the event the Contractor fails to submit such schedule, liquidated damages will be assessed against the Contractor in the amount fixed in Schedule A of the General Conditions, unless the Engineer determines that the Contractor is not the cause for the delay in submitting monthly updates or update information per Monthly Progress Meeting and Reports described herein. The Contractor shall be

notified within one week of said delinquency that the liquidated damages are being assessed against its Contract.

F. Monthly Progress Meeting and Reports, including the use of Contractor Daily Quality Control Reports, shall be used as the basis for updating progress schedules.

1.07 SUBMITTALS

A. Within 7 days after the NTP, the Contractor shall submit the qualifications of the CPM consultant to the Engineer for approval. The Engineer will respond to the submittal within seven (7) calendar days of receipt.

B. CPM Schedule

1. The preliminary CPM Schedule shall be submitted **fifteen (15) calendar days** after NTP. The preliminary CPM Schedule shall include:

   a. All critical mobilization, Project set-up, procurement, and construction activities in each of the major Work areas required during the first 180 calendar days of Contract time after the NTP, including submittals and permitting;

   b. The balance of the Work depicted in summary activities by MLS (milestone), AREA (area), SYS (system) and RESP (responsibility). (See Activity Code Structures for MLS, AREA, SYS and RESP in **Exhibit 1** of this Section);

   c. All submittal and procurement activities for long lead items necessary to meet all Project milestones;

   d. The Project's overall critical path and each milestone's critical path.

   e. An electronic copy of the schedule in Primavera Project Planner (.xer) format.

2. Within fourteen (14) calendar days after submittal of the preliminary CPM Schedule, the Engineer will notify the Contractor of the acceptance, rejection, or acceptance with comments of the preliminary CPM Schedule. If the preliminary CPM Schedule has been rejected, or accepted with comments, the Contractor shall address all comments and re-submit within 14 calendar days for review. The submittal process shall continue until the Engineer accepts the preliminary CPM schedule with no comments.

3. The final, complete and detailed CPM Schedule required for submittal under this Section shall be composed of two parts, with each part due as follows:

   a. Part 1 - Logic and Duration Schedule is due within **sixty (60)** calendar days **after** NTP.

      1) Submit an electronic copy of the schedule in Primavera Project Planner (.xer) format, schedule reports, and the narrative report as specified within this Section.

2) This schedule is at the final level of detail for each Activity, containing the required relationships completely identified and the Duration of each Activity correctly depicted and coded in accordance with this Section.

3) This Baseline Construction Schedule shall identify all Contract milestones.

a) If the schedule reflects completion of a milestone or completion of Contract Work earlier than specified in the General Conditions, this in no way revises or voids the dates set forth in the Contract. The dates specified in the Contract govern.

b) Where the schedule reflects such an early completion date, the schedule may be accepted by the Engineer with the Contractor's understanding that no claim for additional Contract time or an increase in the Contract price shall be made by the Contractor as the result of failure to complete the Work by the earlier date shown on the schedule.

4) This schedule shall show the overall schedule requirements as set forth in Schedule "A" of the General Conditions being met.

a) This detailed CPM Schedule shall not reflect any Contract changes or delays that may have occurred during the interim schedule development period.

b) Any such changes and all progress through the time of Baseline Schedule acceptance will be entered at the first update after the schedule has been accepted.

b. Part 2 - Resource and Cost Loaded Schedule

1) At the direction of the Engineer and at no additional cost to the City, a Resource and Cost Loaded Schedule is due within **30 calendar days** after acceptance of the Logic and Duration Schedule.

a) Submit an electronic copy of the schedule in Primavera Project Planner (.xer) format, schedule reports and other reports as specified in this Section.

b) Each Activity shall be resource loaded to permit initial and monthly generation of a resource and cost curve and to assess the progress of the Work.

c) Cost loading of the schedule is required on a summary level and is not required to the Activity level unless requested by the Engineer. The intent of

the cost loading is to facilitate forecasting, tracking, and reporting of overall cash flow by major work areas or systems, and Specifications. The summary level cost loading requirements will be determined and agreed to by the Engineer during the development of the project-specific schedule coding developed for the Baseline Logic and Duration Schedule and used to track the construction progress.

4. Once the Logic and Duration Schedule is accepted by the Engineer, it shall become the basis for future updates until acceptance of the Resource and Cost Loaded Schedule. The Resource and Cost Loaded Schedule, once accepted, may only contain changes to the Logic and Duration Baseline that are necessitated by resource issues identified during the preparation of the Resource and Cost Loaded Schedule.

5. Once the Resource and Cost Loaded Schedule is accepted, it shall become the Baseline Schedule of record and the basis for future updates. All subsequent monthly updates shall be compared to the Baseline Schedule. In addition, each current monthly update shall be compared to the last accepted update. Each update shall be labeled by period with the Data Date and report date identified on the hard copy and electronic file label.

6. After the acceptance of the Baseline Schedule required by this Section, no changes shall be made to Logic, Duration of actualized activities, or description of Activities therein without acceptance by the Engineer.

7. The Contractor shall have no claim for damages by reason of the failure of the Engineer to give timely acceptance or comments on any progress schedule under this Section.

8. The monthly update schedule submittal to the Engineer shall include the following:

   a. An electronic copy of the schedule in Primavera Project Planner (.xer) format, with Data Date and monthly period clearly marked.

   b. Electronic (.pdf) format copy of the CPM computer printouts in bar chart form, including:

      1) A comparison of the Baseline Schedule Activities against current update Activities organized and summarized by milestone, AREA, and DIV according to the requirements for Activity codes in this Section, or as otherwise directed by the Engineer. Each Activity shall have two bars with different colors (one showing the current schedule and one showing the Baseline Schedule).

      2) A comparison of current activities against the prior month's activities organized and summarized by milestone, AREA,

and DIV according to the requirements for Activity codes in this Section, or as otherwise directed by the Engineer. Each Activity summary shall have two bars with different colors (one showing the current schedule and one showing the prior month's update schedule).

3) A clear presentation of the specific detailed Activities making up the critical path(s) for the Project and for each milestone.

c. Electronic (.pdf) format copy of the Narrative Report as outlined in this Section.

9. Comments made by the Engineer on the initial and monthly updated Current Construction Schedule will not relieve the Contractor from compliance with the requirements of the Contract Documents. This review is only for general conformance with the schedule concept of the project and general compliance with the information given in the Contract Documents.

C. Narrative Reports

1. Schedule Basis Narrative shall be submitted to the Engineer with each Baseline Schedule submittal to memorialize assumptions made in development of the schedule and shall include the following:

a. A description of scope of the project and how the Work is represented in the schedule activities;

b. A description of the overall sequence of major components of Work;

c. Planned work week;

d. Description of the critical path in the proposed Work plan;

e. Basis of Activity Durations;

f. How weather will be accommodated in the schedule;

g. How, regulatory, operational or third party constraints are accommodated in the schedule;

h. Description of key Project coordination points or events;

i. Discussion of long lead items and basis of time frames for submittals;

j. Description of anticipated means and methods for large quantity production Activities;

k. Potential opportunities and risks and quantify the schedule reduction or expansion;

l. Assumptions/exclusions made in the schedule.

2. Update Narrative Report shall be submitted to the Engineer each month with the monthly update submission, and include the following:

a. The Contractor's transmittal letter;

b. Contract complete date status by milestone:

1) Ahead of schedule and number of calendar days;

2) Behind schedule and number of calendar days;

3) Calendar days lost/gained compared with the previous update.

c. Schedule change report organized by milestone and area listing each Activity in the CPM schedule that has been/ will be:

1) Completed during this reporting period;

2) In progress during this reporting period;

3) Scheduled to be performed during the next reporting period.

d. Analysis, organized by milestone and area, of the critical and near critical path/s describing:

1) The nature of the critical/near critical path;

2) Impact on other Activities, milestones and completion dates;

3) Risks and opportunities impacting the critical/near critical paths.

e. List of current and anticipated delays by milestone:

1) Cause of the delay;

2) Corrective actions and schedule adjustments to correct the delay;

3) Impact of the delay on other Activities, milestones and completion dates;

4) Weather delays – when applicable, the Contractor shall describe how the impacts of weather conditions and constraints were absorbed and accounted for in the schedule and documentation showing they were beyond normal for the area or those provided for in the baseline.

f. Changes in Activity descriptions for non-required work Logic, or Duration for actualized and non-required work shall be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the critical path.

g. Added Activities and the rationale associated with each action;

h. Pending issues and status of other items:

1) Permits;

2) Contract modifications;

3) Change orders;

4) Long lead procurement items;

5) Other.

i. Out of Sequence Report describing the necessity of each Activity relationship shown therein, as described within this Section;

j. Illogical Progress/Restraint Reports (if any);

k. Other project or scheduling concerns;

l. Electronic copy of the latest CPM schedule update file in Primavera (.xer) format;

m. Primavera scheduling error report.

D. CPM Progress Meeting and Reports

1. Monthly, on a date established by the Engineer, a CPM Progress Meeting will be held, at which time the schedule will be reviewed. The meeting shall be attended by the Engineer, and representative(s) of the Contractor to include the scheduling consultant. The Contractor representative(s) at the meetings shall have the competence and authority to make any necessary decisions and their statement shall commit the Contractor to the agreed procedures, sequencing of Work, coordination and time schedules.

2. Prior to the meeting, the CPM scheduling consultant shall obtain, through any required means including Site meetings, the necessary information to update the CPM schedule to reflect progress to date and to update/revise the schedule (plan) of the Work for the balance of the project. The updated schedule and draft narrative report shall be furnished to the Engineer at least 72 hours prior to the meeting and be distributed by the Contractor in hard copy at the meeting for review.

3. To update the CPM schedule, the Contractor shall:

a. Enter actual start and completion dates for those Activities started and/or completed during the previous reporting period;

b. For Activities in progress, indicate the Remaining Duration correlating to an accurate forecasted completion date and physical percentage complete to date (Percent Complete is to reflect the actual quantity of Work completed, and is separate from any actual or Remaining Duration calculation). Review, and revise as necessary, the network Logic for the Remaining Duration of the Work from the update to the estimated completion date;

c. For Activities not yet started, review, and revise as required, the necessary Logic, and the estimated start and completion dates;

d. Enter, for each applicable Activity, actual installed quantities information;

e. For identified construction change requests, Extra Work or change orders, add the appropriate detailed schedule Activities upon submittal of Form 1 for changes in the Work. The change order review and registration Fragnet will be provided by the Engineer and shall include the following Activities in sequence:

1) Submittal of Form 1 on the actual date submitted;

2) Contractor pricing of the identified change subsequent to submittal of Form 1;

3) Pricing negotiations;

4) Comptroller review and registration; followed by;

5) Detailed submittal and construction Activities with correct Activity coding as specified within this Section.

4. The total Duration to be initially added to any schedule update reflecting the Activities from submittal of Form 1 to the registration of any specific change order, shall be in accordance with the Fragnet provided by the Engineer and shall be incorporated into the monthly schedule update following the submittal of Form 1 for the change in Work. The forecasted construction Activities shall be logically tied to the appropriate predecessor and successor base Contract Activities and contain all of the required Logic, Duration, and Resource Loading specified for the detailed CPM schedule Activities.

5. In the event the Contractor begins performance in the field of identified Extra Work during the update period, the monthly progress schedule update shall reflect the actual start date of the Work, and any predecessor Logic ties or restraints shall be broken in order to accurately forecast completion of the identified Extra Work Activity. This will allow for accurate forecasting of the successor Work Activities and completion milestones.

a. Annotate updated status information on the CPM schedule update in a manner that will graphically depict the current status of the Work;

b. Should discrepancies regarding data/information accuracy be noted during the review meeting or other discussions, the Engineer may direct the Contractor to adjust the percentage completion, Remaining Duration and actual dates to selected activities and re-issue the updated schedule and reports.

6. Default progress data provided from the scheduling system shall not be allowed. Actual start and finish dates and Remaining Durations of Activities shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual start and finish dates on the CPM schedule shall match those dates provided from the

Contractor's Daily Quality Control Reports. Failure of the Contractor to document the actual start and finish dates on the Contractor Daily Quality Control Report for every in-progress or completed Activity, and to ensure that the data contained on the Contractor Daily Quality Control Reports is the sole basis for schedule updating, shall result in the disapproval of the Contractor's submittal.

7. Activities that have reported progress without predecessor Activities being completed (out-of-sequence progress) will not be allowed except on a case-by-case basis with the approval of the Engineer. A written explanation for each instance shall be included in the monthly submittal.

8. The Contractor shall not constrain the schedule with artificial Logic ties and or constraint dates and or any other scheduling techniques that may distort the Activity Float and Total Float associated with the critical path Activities and the schedule in general.

9. In addition to the requirements of the General Conditions, the Contractor shall submit monthly the proposed correlated sequence and estimated dates for submission, approval and final submission activities for the following:

   a. Working drawings submittals;

   b. Equipment operation and maintenance manuals submittals;

   c. Witness shop tests;

   d. Delivery of materials and equipment to Site;

   e. Final field tests;

   f. Special tools and lubricant deliveries;

   g. Spare part deliveries;

   h. Instructional services;

   i. Permits;

   j. Final record documents;

   k. Startup and commissioning/testing;

   l. Piping and equipment identification.

10. The above information shall be presented in an organized tabular format, showing for each submittal item, organized by item:

    a. Submission date (actual or forecast);

    b. Approval date (actual or forecast);

    c. Final submissions (actual or forecast);

    d. Comments (actual or forecast).

11. Equipment/material procurement information shall be presented in an organized tabular format, showing for each item, organized by item:

a. Drawing submittal date (actual or forecast);

b. Drawing approval date (actual or forecast);

c. Release for fabrication date (actual or forecast);

d. Witness shop test date (actual or forecast);

e. Delivery date (actual or forecast).

E. Remedial Measures and Recovery Schedule

1. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the critical path have occurred due to action or inaction of the Contractor, and as a result the Contract completion date will not be met, the Contractor shall take some or all of the following actions at no additional cost to the City, in addition to and apart from the other requirements of this Section, as directed by the Engineer:

   a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

   b. Increase the number of working hours per shift, shifts per day, or working days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.

   c. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities, and comply with the revised schedule.

   d. Submit to the Engineer for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule. The Contractor shall promptly provide the necessary level of effort to bring the Work back on schedule.

2. The Engineer may require the Contractor to add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

3. The Engineer may require the Contractor, at any time during the project and at no additional cost to the City, to develop a more detailed schedule/Fragnet than depicted in the detailed Baseline Schedule to provide a clearer understanding of the effort needed to complete a specific area of Work or task.

4. Should the Contractor fall behind schedule, the Engineer may require the Contractor to prepare a recovery schedule for Engineer review and acceptance. The recovery schedule shall propose alternative methods, overtime, and other means available to the Contractor to recover the schedule slippage incurred to date.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT 1 -- WORK BREAKDOWN STRUCTURE

WBS Code	WBS Name
CAT-475-90.1	General Conditions
CAT-475-90.1.1	Substantial Completion
CAT-475-90.2	Procurement
CAT-475-90.2.0	Permits
CAT-475-90.2.1	Division 01 - General Requirements
CAT-475-90.2.2	Division 02 - Existing Conditions
CAT-475-90.2.3	Division 03 - Concrete
CAT-475-90.2.4	Division 04 - Masonry
CAT-475-90.2.5	Division 05 - Metals
CAT-475-90.2.8	Division 08 - Openings
CAT-475-90.2.9	Division 09 - Painting
CAT-475-90.2.10	Division 10 - Specialties
CAT-475-90.2.26	Division 26 - Electrical
CAT-475-90.2.28	Division 28 - Electronic Safety & Security
CAT-475-90.2.31	Division 31 - Earthwork
CAT-475-90.2.32	Division 32 - Exterior Improvements
CAT-475-90.2.35	Division 35 - Waterway & Marine Construction
CAT-475-90.2.40	Division 40 - Process Interconnections
CAT-475-90.3	Construction
CAT-475-90.3.1	Mobilization / Demobilization
CAT-475-90.3.2	High Level Outlet
CAT-475-90.3.2.1	HLRT Cofferdam
CAT-475-90.3.2.2	Tunneling
CAT-475-90.3.2.3	High Level Release Tower
CAT-475-90.3.2.4	Existing Upper Gate Chamber
CAT-475-90.3.3	Spillway Crest Restoration
CAT-475-90.3.4	Exterior

EXHIBIT 2 – ACTIVITY ID FORMAT

1. Activity ID format: Activity ID's shall be preceded by the Contract identifier: CAT-475 -#### …
2. Do not use the letters X or Z within the activity ID as these are reserved for DEP use

3. For Activities added to the schedule during the project representing Contract change order execution and Extra Work, the Contractor shall insert "CO" after the Contract identifier and use the succeeding numbers to identify the change order number.

EXHIBIT 3 – SCHEDULE MILESTONES

1. NTP: CAT-475-####;
2. Substantial Completion: CAT-475-####;

EXHIBIT 4 -- PROPOSED ACTIVITY CODES

1. **CAT-475_RESP -** Responsibility Code – The party contractually responsible for the scheduled Activity. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
DEP	1	Department of Environmental Protection
ENG	2	DEP's Design Engineer
CCM	3	DEP's Construction Manager
GEN	4	General Prime Contractor
ELE	5	Electrical Subcontractor
HVC	6	HVAC Subcontractor
PLB	7	Plumbing Subcontractor

2. **CAT-475_MLS -** Milestone Code – Milestones specified in the Contract. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
M1	1	Notice To Proceed
M2	2	Substantial Completion

3. **CAT-475_LOC -** Location Code – Project location specified in the Contract. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
MOBE	1	Mobilization/Demobilization - CAT-475
HLO	2	High Level Outlet - CAT-475

4. **CAT-475_AREA -** Area Code - The specific area within the project Site where the Work is taking place. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
COFF	1	CAT-475 HLRT Coffer Dam
TUNN	2	CAT-475 Tunnel
HLRT	3	CAT-475 High Level Release Tower
UGC	4	CAT-475 Existing Upper Gate Chamber
CRST	5	CAT-475 Crest Restoration
EXT	6	CAT-475 Exterior Work

5. **CAT-475_OPER** - Operation Code - The operation or type of Work
   Note: The operation codes listed are for example only. The specific operation codes will be determined during the development of the Baseline Logic and Duration schedule and will reflect the Contractor's anticipated means and methods. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
01	1	General Requirements
02	2	Site Clearing
03	3	Site Earthwork
04	4	Utilities
05	5	Access Roads
06	6	Temp Facilities
07	7	Erosion Control
08	8	Concrete
09	9	Landscape
10	10	Drainage
11	11	Temp Power
12	12	Lighting
13	13	Dewatering
14	14	Masonry
15	15	Metals
16	16	Wood and Plastics
17	17	Thermal and Moisture Protection

VALUE	SEQUENCE	TITLE
18	18	Doors and Windows
19	19	Finishes
20	20	Specialties
21	21	Equipment
22	22	Furnishings
23	23	Special Construction
24	24	Conveying Systems
25	25	Mechanical
26	26	Electrical
27	27	Instrumentation and Control
28	28	Site Restoration
29	29	Piping modifications
30	30	Electrical modifications
31	31	Maintenance Activities

6. **CAT-475_ADD -** Activities Added – Code for Activities added during the current schedule update period. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
001	1	Activity Added in Update #01
002	2	Activity Added in Update #02
003	3	Activity Added in Update #03
Continued – to be updated by Contractor in each Progress Schedule		

7. **CAT-475_CO# -** Change Order Number – Code for Activities added for Change Order work. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
G001	1	G001 – General Change Order No.1 Description
G002	2	G002 – General Change Order No.2 Description
Continued – to be updated by Contractor in each Progress Schedule		

8. **CAT-475_Contractor** General Contractor. This Activity Code field should be defined as being seven digits in length.

VALUE	SEQUENCE	TITLE
G1	1	General Contractor
E1	2	Electrical Subcontractor
H1	3	HVAC Subcontractor
Continued – to be updated by Contractor in each Progress Schedule		

9. **CAT-475_Point of Contact** DEP Accountable Manager. This Activity Code field should be defined as being seven digits in length.

VALUE	SEQUENCE	TITLE
RB	1	Brian Rogers
Continued – to be updated by Contractor in each Progress Schedule		

10. **CAT-475_Key Milestones** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

11. **CAT-475_Standard Milestones** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

12. **CAT-475_Temporary** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

13. **CAT-475_Hide** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

14. In addition to the required Activity coding outlined above, the Engineer may direct the Contractor to provide additional Activity coding, at no additional cost to the City, in order to facilitate the management of the project and schedule. Additional Activity coding may include:

    a. SUBC – Code designating major subcontractors or vendors;

    b. SYST – Code designating process or functional system;

    c. TYPE – Code designating general type of Work;

    d. PHAS – Phase of Work in accordance with construction phasing requirements.

EXHIBIT 5 – PROJECT CALENDARS

1.	CAT-475_5D1S	-	5 days per week and one shift per day
2.	CAT-475_5D2S	-	5 days per week and two shifts per day
3.	CAT-475_5D3S	-	5 days per week and three shifts per day
4.	CAT-475_7D3S	-	7 days per week and one shift per day
5.	CAT-475_Planting	-	Contains months warm enough for planting vegetation
6.	CAT-475_X-Xxx	-	Limited months in calendar year (Xxx – Xxx) work can occur.

SECTION 01 32 30 – JOB PHOTOGRAPHS AND VIDEOS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Pre-Construction Photographs, Aerial Photographs and Videos
2. Construction Photographs, Aerial Photographs and Videos
3. Post-Construction Photographs, Aerial Photographs and Videos
4. Informational Video
5. Public Design Commission (PDC) Photographs

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	8
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 31 25 - Web-based Project Management Information System

1.04 REFERENCES

A. Definitions

1. For the purposes of this Section, “Photograph” shall be defined as one digital camera image, which is approved by the Engineer for development into the products specified herein.

2. For the purposes of this Section, an “Aerial Photograph” shall be defined as one aerial view, approved by the Engineer, for development into the products specified herein.

B. Reference Standards

1. International Organization for Standardization

a. ISO 18902: 2013 - Imaging materials -- Imaging Materials – Albums, Framing and Storage Materials.

b. ISO-IEC 14496-14 Information technology -- Generic coding of moving pictures and associated audio information: MPEG-4 Part 14 (MP4 file format).

c. IPTC/XMP (International Press Telecommunications Council's/Adobe Extensible Metadata Platform) Standard

1.05 DESCRIPTION

A. Unless specifically noted otherwise, all Work of this Section shall be performed by the General Contractor.

B. The Contractor shall engage the services of experienced professional photographers and/or video recording firms, approved by the Engineer, to document the progress of Work by taking color job Photographs, Aerial Photographs and videos. The photographer shall take Photographs, Aerial Photographs and videos of the Project before start of construction work, during ongoing construction, and after completion of construction as directed by the Engineer and as needed for obtaining Public Design Commission (PDC) approval.

C. A designee of the Engineer will accompany the photographer for the taking of all photographs and videos.

D. Pre-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site prior to start of construction to take a total of 100 Photographs and make a 45 minute video showing existing conditions of the entire project site and any adjacent areas which could possibly be disturbed during construction.

2. 16 Aerial Photographs shall be taken which showcase the project site in relation to the surrounding neighborhood.

E. Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site during construction on a monthly basis unless the Engineer requests different frequencies of the visits, to take a total of 6,100 Photographs for the project and to visit the site when directed by the Engineer to tape a total of 40 hours of videos. Photographs taken and video minutes taped shall be distributed evenly among the visits and visits shall be distributed evenly over the course of the Project, all subject to the direction of the Engineer.

2. A total of 80 Aerial Photographs shall be taken with 8 views, at 10 phases of construction, as determined by the Engineer.

F. Post-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site at the completion of construction to take a total of 150 Photographs and make a 45 minute video showing the completed Work, the entire Project Site and any adjacent areas which were disturbed during construction.

2. 16 Aerial Photographs shall be taken showing the completed Work, the entire project site and any adjacent areas which were disturbed during construction.

G. Informational Video

1. The Contractor shall engage a professional video recording firm to develop a finished 60-minute informational video as directed by the Engineer.

2. The video shall be developed by editing the videos made during the pre-construction, construction and post-construction stages of the project, as well as any additional taping needed to complete the documentation of Work at the Project Site.

H. Public Design Commission (PDC) Photographs (see City of New York Standard Construction Contract Article 47)

1. The photographer, when directed by the Engineer, shall visit the Site at the completion of construction to take a total of 16 Photographs of Work that received final approval by the PDC during design. The Work to be photographed for submission to PDC is as follows:

   a. View of dam from West Access Road

   b. View of HLRT from crest roadway

   c. View of HLRT from upstream embankment near waterline

   d. View of Plunge Pool End Sill from crest of dam

   e. View of Spillway from downstream of East Training wall

   f. View of Spillway from East Overlook

   g. View of Spillway face and HLO outlet from near control Panel CP-8

h. View of HLRT rooftop from Upper Gate Chamber rooftop

i. View of bar screen at Plunge Pool End Sill

j. View of HLO access stairway along West Training Wall

k. View of Monolith M18 spillway crest

l. View of Monolith M15 through M17 spillway crest

m. Four additional views as directed by Resident Engineer

2. Prior to taking PDC Photographs, all surrounding areas shall be cleared of any construction-related material and equipment, including but not limited to construction cones, construction signage, temporary fencing and other temporary facilities.

3. The Contractor may utilize the professional photographer firm described in Article 1.06 to take the PDC photographs. If the PDC photographs are unacceptable by PDC, the Contractor shall hire a separate architectural photographer to re-take the PDC photographs at no additional cost to the City.

1.06 QUALITY ASSURANCE

A. Photographs shall be clear with proper exposure. New Photographs are to be taken immediately if Photographs of an adequate quality cannot be achieved. Photographs shall be of a quality to permit enlargements.

B. The professional photographer and professional video recording firm shall have a minimum of three (3) years of experience with duties similar to those specified herein. The qualifications of the professional photographer and professional video recording firm shall be subject to review by the Engineer.

C. All videos shall be made using professional-type video cameras and with adequate lighting.

1.07 SUBMITTALS

A. Submittals shall include, but not be limited to, the following:

1. Resume of the professional photographer proposed for this Work.

2. Resume and experience of the professional video recording firm proposed for preparing the informational video.

3. Plot plans indicating the location and unique sequential identifier of all Photographs.

4. Photo log of all Photographs and associated metadata in an Excel spreadsheet.

5. One (1) set of all Photographs / Aerial Photographs taken for the Engineer's review and approval for processing further.

6. The Contractor shall provide the Engineer with updated images, key plans and Photograph logs on a monthly basis.

B. Submittals shall be made in accordance with Section 01 31 25 - Web-based Project Management Information System.

1. PDC Photographs shall be submitted in both digital format and print format.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. All Photographs, Aerial Photographs, and videos resulting from the Work under this Contract shall become the exclusive property of the City upon their creation.

B. Neither the Contractor nor the photographer nor the video recording firm shall retain any rights pertaining to the Photographs, Aerial Photographs, and videos nor shall they reproduce or otherwise publish or disseminate any of the Photographs, Aerial Photographs, prints or videos taken under this Contract without the prior written approval of DEP.

C. The Photographs, Aerial Photographs, and videos shall be considered "work made for hire" under applicable provisions of the Copyright Act, and the City shall be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might subsist. To the extent that such materials do not qualify as "work made for hire", the Contractor hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to such materials to the City, free and clear of any liens, claims or other encumbrances. The agreements between the Contractor and the photographer and video recording firm shall contain a provision containing these requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Photographs

1. Digital cameras shall produce records with true optical resolution. Images shall not be resized or interpolated to a higher resolution from a lower resolution.

2. One set of digital images shall be submitted to DEP's web-based Project Management Information System.

3. Photographs should be embedded with metadata using the IPTC/XMP (International Press Telecommunications Council's/Adobe Extensible Metadata Platform) Standard. This includes:

a. Project number

b. Project name

c. Contract number and description

d. Unique sequential identifier

e. Description of Vantage point, indication location, direction and other pertinent information

f. General description of what the Photograph represents

g. Global Positioning System (GPS) location data

h. Phase of Construction (i.e. pre-construction, construction or post-construction)

i. Date and time Photograph was taken if not date stamped by camera

j. Name of photographer

k. Name of Department of Environmental Protection witness

4. The Contractor shall transmit one (1) electronic copy of each Photograph to the Engineer for use in preparing descriptions. The Photographs with descriptions will be returned to the Contractor for record management.

5. PDC Photographs

a. Print PDC Photographs shall be 8-inch x 10-inch, archival-quality prints.

b. Digital PDC Photographs shall be at least 300 DPI at 8-inch x 10-inch.

B. Aerial Photographs

1. One set of digital images shall be submitted to DEP's web-based Project Management Information System. Aerial Photographs shall meet the digital Photograph requirements of this Section, except that they shall be a minimum 50 megapixel file size.

C. Videos

1. Video recordings shall be ASTC format, 1080P (1920 x 1080) using MPEG-4 Program Stream encoding (ISO-IEC 14496-14 "Coding of audio-visual objects -- Part 14: MP4 File Format"), using professional video cameras with clear and succinct narrative. The narrative material shall be developed in conjunction with the Construction Manager, Contractor, and Engineer.

a. All video recordings shall begin with a chapter index listing the contents in detail and providing direct access to each chapter.

b. All video recordings must include on parallel tracks metadata (catalogue information) to include the date and time of recording,

the name of the area being documented, the project name, direction of travel, the viewing side, project number, Contract number and description, name of photographer and Department of Environmental Protection witness. The date and time shall be on a track separate from the rest of the metadata and, when displayed, shall appear in the upper left hand corner of the picture. Time and date shall use the following format:

Time: HH;MM;SS (using 24-hour clock time)
Date: MM/DD/YYYY

c. The project number, project name, Contract number and description, name of photographer and Department of Environmental Protection witness, when displayed, shall appear on the lower half.

2. Video output from camera used must be capable of producing full HD resolution (1920 x 1080). Geometric distortion should not exceed two (2) percent of picture height at any point in picture area.

3. All recording shall be done with adequate lighting. Written authorization by the Engineer to proceed with video documentation at any areas must be done with consideration of existing environmental conditions. The designee of the Engineer will accompany the photographer during all taping sessions.

4. During the recording period, all records shall be turned over to the Engineer for review of the content and quality. Any portion of the recording deemed unacceptable by the Engineer shall be re- recorded by the Contractor at no additional cost to the City.

5. One copy of all acceptable recordings shall be furnished and shall be properly identified by container number, equipment, location and project name. A record of the contents of each recording shall be provided on a run sheet, identifying each chapter segment of the recording.

D. Informational Video

1. The informational video shall have titles and audio defining all aspects of Work activities. In consultation with the Engineer and the City, the video shall develop the basic design criteria, explain each phase of excavation or construction, extras or credits, safety highlights, concrete, steel and other suppliers, disposal of materials, dewatering, control of groundwater, and other such items.

2. Two copies of the acceptable informational video (flash drive or hard drive) shall be furnished and shall be properly identified and labeled. Identifying information furnished on the informational video shall be the same as specified for other videos in this Section.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Photographs

a. The file format for Photographs shall be color, uncompressed Tagged Image File Format (TIFF) produced by a digital camera with a minimum sensor size of 12 megapixel files or greater, and at an image resolution of not less than 5,000 pixels by 3,500 pixels at 300 dpi or greater

b. Photographic images shall be provided as 8 bit per channel RGB color images.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Submittal Categories
2. Schedule of Submittals
3. Letter of Transmittal
4. Contractor Responsibilities
5. Shop Drawings Submittal
6. Approval of Shop Drawings not a Waiver
7. Final Copy – Shop Drawings

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	6
3.03	Field Testing / Quality Control	14
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

C. The following Schedule, attached after the “End of Section” designation, is a part of this Section:

1. Attachment 01 33 00-1 - Sample Schedule of Submittals

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 31 25 – Web-Based Project Management Information System

B. Section 01 32 10 – Progress Scheduling

C. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Submittals includes all types of drawings and other documents required to be prepared or assembled and submitted to the Engineer by the Contractor before, during, or after construction, such as, but not limited to, the following "submittal categories":

1. As-Built Drawings;
2. Bid Submittals;
3. Certifications;
4. Construction Progress Photos and Videos;
5. Baseline and Monthly CPM Progress Schedules
6. Final Record Documents;
7. Material Safety Data Sheets;
8. Mock Ups;
9. Operation and Maintenance Manuals;
10. Permits;
11. Plans (or Procedures);
12. Preliminary and Final Test Procedures
13. Product Data;
14. Reports;
15. Samples;
16. Schedule of Submittals;
17. Shop Drawings;

a. Shop Drawings includes all drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the Work.

18. Shop Test Procedures;

19. Spare Parts;

20. Test Reports;

21. Warranties.

1.06 QUALITY ASSURANCE

A. Shop Drawings shall be submitted so that they can be approved within the first three (3) submissions. Starting with the fourth submission, liquidated damages will be assessed against the Contractor in accordance with Schedule A of the General Conditions.

1.07 SUBMITTALS

A. The Contractor shall submit a schedule of submittals in accordance with the requirements of this Section, for review and approval.

1. The Contractor shall resubmit an updated schedule of submittals to the Engineer for review and approval on the first day of each month until Substantial Completion, unless otherwise directed to submit less frequently by the Engineer.

2. The Schedule of Submittals shall demonstrate coordination with the CPM Schedule submitted under Section 01 32 10 - Progress Scheduling. Changes and updates to the CPM Schedule shall be reflected in the specified resubmissions of the Schedule of Submittals.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All Submittals shall have identifying titles and bear the signature of the Contractor as evidence that they have been reviewed and approved by the Contractor and that they conform to the requirements of the Contract Documents. Submittals without this stamp of approval will not be reviewed by the Engineer and will be returned to the Contractor.

1. The stamp shall contain the following minimum information:

Project Name: _____

Contract No.: _____

Contractor's Name: _____

Date: _____

Item: _____

Section No(s).: _____ Section Title(s): _____

Article No(s). _____ Paragraph No(s).:_____

Contract Drawing No(s): _____

Location: _____

Submittal No.: _____ Review Cycle No.: _____

Shop Drawing Reference No.: _____

Source Company Name: _____

This submittal was reviewed for conformance with the Contract Document requirements and approved by: _____

2. All applicable Specification sections, subsections, articles, paragraphs and drawings shall be noted in the stamp.

B. Submittal Identification and Tracking: In order to identify and track each submittal as a separate and unique item, the Contractor shall utilize a submittal numbering system as follows:

1. Submittal Number:

a. The Submittal Number shall be a separate and unique number correlating to each individual Submittal that needs to be tracked as a separate and unique item.

b. The Submittal Number shall be a two-part number assigned by the Contractor in the following manner:

1) The first part of the Submittal Number shall consist of 6 to 10 digits that pertain to the applicable Specification section.

a) Include all spaces (and decimal, if applicable) as per the Specification section title.

2) The second part of the Submittal Number shall consist of three digits (the numbers 001 to 999) to number each separate and unique submittal under each Section.

3) A dash shall separate the two parts of the Submittal Number.

4) For example:

a) The submittal number for the third submittal under Section 09 91 00 – Painting, would be 09 91 00-003.

b) The submittal number for the first submittal under Section 40 05 59.16 01 – Stop Logs (Aluminum), would be: 40 05 59.16 01-001.

2. Review Cycle Number:

a. The review cycle shall be identified by a three-digit number indicating whether a Submittal is the initial submission (i.e., "000") or a resubmission of an earlier Submittal (i.e., "001" or higher).

1) The first resubmission, for example, would be assigned "001"; the second resubmission will be assigned "002"; etc.

b. Liquidated damages will be assessed upon rejection of any Submittal identified as "003" in the review cycle.

C. Submittals shall include appropriate references to all related and pertinent Contract Drawing(s) and Specification Section(s).

D. In submitting Shop Drawings for approval, all associated drawings relating to a complete assembly of various parts necessary for a unit shall be included. Shop Drawings shall not be submitted until the full set of associated drawings is complete, so that they may be checked in relation to the assembly proposed.

E. All items of electrical equipment constituting an operating system and any mechanical units involved therein or necessary for the functioning of such system shall be submitted at the same time and shall include clear diagrams showing circuit functioning and necessary details for field construction.

F. Partial, incomplete, or illegible submissions will be marked "Rejected" and returned to the Contractor without review, for resubmission.

G. Final Copy Shop Drawings: The Contractor shall furnish all "Final Copy Shop Drawings" to the DEP as a condition precedent to the Commissioner issuing a written determination of Final Acceptance. Final Copy Shop Drawings shall be submitted in accordance with Section 01 78 39 – Final Record Documents.

3.02 IMPLEMENTATION

A. General:

1. All Submittals including, but not limited to, Shop Drawings and inquiries pertaining to engineering features or Specification and Contract Drawing interpretations, shall conform to the General Conditions and the requirements of this Section and Section 01 31 25 – Web-Based Project Management Information System.

2. Within 30 calendar days from the work commencement date specified in the Notice to Proceed (NTP), the Contractor shall prepare and submit for the Engineer's approval a Schedule of Submittals which it proposes to follow, listing Section references, names of Submittals required, and the dates on which the Contractor proposes to make the Submittals. The proposed dates of submittals must be chronologically complementing the CPM schedule.

a. No other Submittals shall be accepted for review until the Schedule of Submittals is received and approved by the Engineer. Submittals that are submitted prior to approval of the schedule of submittals shall be returned "Rejected".

b. The Schedule of Submittals shall be in the form of a table.

1) Each row in the schedule of submittals shall include, but not be limited to, the following data divided into columns:

a) The first part of the submittal number.

b) The second part of the submittal number.

c) The title (or name) of the submittal.

d) The review cycle.

(1) As the project progresses, data for resubmittals shall be added as separate rows under each submittal number.

e) The date of submission, anticipated (for future submittals) or actual (for past submittals).

f) The date the submittal is returned.

(1) For future or anticipated submittals, use "N/A".

(2) For past submittals, use the actual date the submittal is returned.

g) The disposition of the submittal:

(1) For future or anticipated submittals, use "N/A".

(2) For past submittals, use the actual disposition (e.g., FAS, FAC, R&R, etc.).

c. Refer to Attachment 01 33 00, Sample Schedule of Submittals, for an example schedule of submittals table.

d. The Schedule of Submittals is intended to be exhaustive, including all anticipated future submittals with reasonable estimates for submittal dates.

e. The Schedule of Submittals shall demonstrate coordination with the CPM Schedule submitted under Section 01 32 10 - Progress Scheduling.

3. Submittals shall be made as directed by the Engineer. All submittals shall be in the English language with U.S. customary units of measurement being used in all drawings and data.

4. The Contractor shall use the project Web-Based Project Management Information System to submit all documents as directed by the Engineer and as described in Section 01 31 25 – Web-Based Project Management Information System.

5. Samples shall be shipped directly to the Engineer. A copy of the transmittal with photographs (JPEG format) of the samples (minimum three (3) angles per sample) shall be entered into the web-based Project Management Information System.

B. Letter of Transmittal or Inquiry

1. A letter of transmittal shall accompany each submission. If data for more than one Section of the Specifications is being submitted, a separate transmittal letter shall accompany the material being submitted under each Section. To the extent possible, letters of inquiry concerning certain phases of the Contract shall also deal with only one Section of the Specifications.

2. At the beginning of each letter of transmittal and each letter of inquiry, provide a reference heading indicating the following:

Owner's Name: NYC Department of Environmental Protection
Project Name: _____
Contract Number: _____
Transmittal Number: _____
Section and Item Number: _____

3. If submittals show variation from the requirements of the Contract, the Contractor shall make specific mention of such variation in the Submittal package.

C. Contractor Responsibilities

1. The Contractor shall review all submittals before transmitting them to the Engineer for review and approval.

a. Prior to transmitting each submittal to the Engineer:

1) The Contractor shall ensure proper coordination of the Work submitted.

2) The Contractor shall ensure that each submittal is in accordance with the requirements of this Section.

3) The Contractor shall ensure that each submittal is in accordance with each and all applicable submittal requirements of the corresponding Specification section(s) and/or drawings.

4) The Contractor shall ensure that each submittal contains sufficient documentation and information, presented plainly and clearly, to verify each and all requirements that are contained within the Specification Section(s) or shown on the Contract Drawing(s) prior to transmission to the Engineer.

b. Regardless of what a manufacturer, fabricator, subcontractor, etc. transmits to the Contractor, it is the Contractor's exclusive responsibility to ensure completeness of the submittal package prior to transmitting the package to the Engineer for review.

1) Packages that are incomplete, whether by failing to include all materials required to be submitted by the pertinent Specification section(s) and/or contract drawings, or whether failing to transmit any and all information needed to verify every feature, detail, etc. that is specified and/or shown, may be returned "Rejected" for the Contractor to resubmit.

c. A note shall appear on the first page of each submittal indicating that the Contractor has reviewed the submittal and verified that the

submittal meets the requirements specified in Section 01 33 00 – Submittal Procedures, Articles 3.02C.1.a and 3.02C.1.b.

1) Shop Drawings not so checked and noted shall be returned to the Contractor with a disposition of 'Rejected' for noncompliance with the requirements of the Contract Documents.

2. Approval of Submittals shall not relieve the Contractor of the responsibility of furnishing materials and equipment of proper dimension, size, quality, quantity, and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Approval shall not relieve the Contractor of responsibility for errors of any sort on the Submittals. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the Work of all trades.

3. Approval of any Submittal by the Engineer only determines its overall agreement with the information given in the Contract Documents. Approval of any Submittal by the Engineer does not constitute a representation that the Submittal was found to conform to all requirements of the Contract

D. Shop Drawing Submittals

1. The Contractor shall promptly prepare and submit Shop Drawings of all parts of the Work as specified herein. Shop Drawings which are full size shall be on "D" size, 22" x 34" ANSI standard drawing sheets. All Shop Drawings shall be drawn to scale.

2. Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following:

a. All shop and erection dimensions;

b. Arrangement and sectional views;

c. Necessary details, including complete information for making connections between Work under this Contract and work under other contracts;

d. Kinds of materials and finishes;

e. Parts list and description thereof.

3. Each Shop Drawing shall be dated and contain:

a. The name of the project and the Contract number;

b. The descriptive names of equipment or materials covered by the drawing and the Contract item number or numbers under which it is or they are required;

c. The locations or points at which the materials or equipment are to be installed in the Work.

4. Shop Drawings for equipment requiring electrical and/or mechanical connections shall show the units of equipment in the proposed position for installation and the details of attachments and connections required, with locations referred to each other and to the structure.

5. Whenever mechanical equipment, electrical equipment, tanks, pipe sections, structural and architectural details and other related items are to be permanently installed in the structures or are of sufficient weight and bulk to cause excessive stresses on the structural members and frame while being hauled, rigged, hoisted, blocked and placed in final positions, the Contractor shall submit, in advance of this Work, to the Engineer for approval, Shop Drawings showing the methods and sequence of the positioning operations, the size and material of all skids, blocks, falsework, runways, etc., the capacities of hand-operated and electric hoists and chain blocks, the positions of the hoists on the completed structural frame, temporary shores and supports, the capacities of winches and their position of attachment and similar and related rigging equipment required to effect the successful positioning of the permanently installed mechanical and electrical equipment.

6. Mechanical and electrical equipment shall not be moved across the floor of the structure without first covering the floor with timber of sufficient size so that the applied loads will be transferred to floor beams and girders of steel or concrete. If it is required to reduce bending stresses or deflection, the beams and girders shall be provided with temporary supports.

7. The Shop Drawings shall also show the loads at points of concentration, the stresses in the structures due to these temporary loads, the size and class of material of the temporary members and bracing installed or placed to minimize excessive stresses in the completed structures and computations to demonstrate that the temporary rigging equipment and accessories will not damage or injure any portion of the completed structure.

8. The approval by the Engineer of Shop Drawings for rigging and hoisting electrical and mechanical equipment and related items in final position will not relieve the Contractor of its responsibility to ensure the safety of the rigging operations, the equipment to be installed and its personnel nor will it relieve the Contractor from its responsibility not to damage completed structures, parts or members thereof or other installed equipment. The Contractor shall make good, repair or replace any damaged or injured items, structural, mechanical, electrical, architectural or landscaping, promptly and effectively to the satisfaction of the Engineer and at no extra cost to the City.

9. Supporting structures designed by Contractor: Supporting structures, which the Contractor is required to design, shall be of sufficient strength to safely withstand all stresses to which they may be subjected, within permissible deflections, and shall meet the applicable requirements under NYCBC, ASTM A36 and AISC Specifications for structural steel.

10. Engineer's assumed design data: All structural steel, concrete and reinforcement indicated or specified to fully or partially support equipment or appurtenances and the areas immediately adjacent thereto, have been designed from data based on assumed average anticipated clearances and loadings. The final structural design in these locations will be based on definite data available only after the Engineer approves the equipment and appurtenances to be installed. Therefore, no Shop Drawings pertaining to such supporting steel or concrete structures shall be submitted until the Contractor is furnished with full data relative to the approved equipment and appurtenances.

11. Necessary major changes in framing will be covering by supplementary or revised drawings which will be furnished to the Contractor. All changes indicated or necessary to accommodate the equipment and appurtenances shall be incorporated into the Shop Drawings submitted for approval.

12. Shop Drawings for the work in paragraphs 9, 10, and 11 above shall be prepared by or under the direction of a qualified licensed Professional Engineer, currently registered in the State of New York, and shall bear the imprint of their seal and signature.

E. Shop Drawings Approval

1. Shop Drawings submitted to the Engineer shall contain complete data on the Work and full information on related matters.

2. In submitting Shop Drawings for approval, all associated drawings relating to a complete assembly of various parts necessary for a unit shall not be submitted until the assembly of drawings is complete so that they may be checked in relation to the assembly proposed. Where errors, deviations and/or omissions are discovered later, they shall be made good by the Contractor irrespective of any approval by the Engineer.

3. With Submittals, the Contractor shall notify the Engineer of all departures from the Contract Drawings and Specifications; otherwise, approval of such Submittals will not constitute approval of the departure. Approval of a Submittal will constitute approval of the subject matter thereof only and not of any other structure, material or apparatus shown or indicated.

4. If the Contract Documents specify that a submittal (or a portion thereof) shall bear the signature and seal by a registered professional engineer, then in order for said submittal to be considered complete, the requisite documents must bear the signature and seal of a registered professional engineer at the time of submittal.

a. The submittal of draft documents for review without signature and seal is unacceptable. Such documents shall be considered incomplete and shall be returned with a disposition of "Rejected" without review.

5. Materials or equipment shall not be ordered nor shall any Work be done by the Contractor before the materials, the equipment and the Shop Drawings as herein required have been approved by the Engineer.

6. After the Engineer completes the review, the Submittals will be marked with one of the following notations of dispositions:

- Furnish as Submitted (FAS)
- Furnish as Noted (FAN)
- Furnish as Corrected (FAC)
- Revise and Resubmit (R&R)
- Rejected (R)
- For Information Purposes Only (FIO)

a. If a Submittal is acceptable, it will be marked "Furnish as Submitted", "Furnish as Noted", or "Furnish as Corrected". If a Submittal is unacceptable, it will be marked "Revise and Resubmit" or "Rejected."

b. Upon return of a Submittal marked "Furnish as Submitted", "Furnish as Noted", or "Furnish as Corrected", the Contractor may order, ship or fabricate the materials included on the Submittal, provided they are in accordance with any corrections indicated.

1) Upon return of a Submittal marked "Furnish as Corrected", the Contractor shall make the corrections indicated, and resubmit the Shop Drawings to the Engineer.

2) Upon return of a Submittal marked "Furnish as Noted", the Contractor shall make the corrections indicated, but does not need to resubmit the Shop Drawing to the Engineer unless the Contractor disagrees with the corrections noted.

c. Upon return of a Submittal marked "Revise and Resubmit", the Contractor shall make the corrections indicated, clearly noting any revisions and repeat the initial approval procedure.

d. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a Submittal so marked, the Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment.

e. The "Rejected" notation is also used for submittals where the Contractor did not review the submittal for completeness prior to transmission to the Engineer as specified in this Section.

f. Shop Drawings or other Submittals not bearing the Engineer's "Furnish as Submitted", "Furnish as Noted", or "Furnish as Corrected" notation shall not be issued to Subcontractors nor utilized for construction purposes. No Work shall be performed or equipment installed without a "Furnish as Submitted", "Furnish as Noted", or "Furnish as Corrected" drawing or Submittal.

7. In the event the Contractor obtains the Engineer's approval for the use of equipment other than that which is shown or specified in the Contract Documents, the Contractor shall, at its own expense and using methods approved by the Engineer, make all changes to the Work, including structures, piping, and electrical equipment and controls that may be necessary to accommodate this equipment.

8. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for time required to make delivery of material or equipment after the Submittal covering such is approved. The Contractor shall assume the risk for all materials or equipment which are fabricated or delivered prior to the approval of Shop Drawings. No materials or equipment will be permitted to be incorporated into the Work nor will such be included in monthly payment estimates until approval thereof has been obtained in the specified manner.

9. The Engineer will review and process all Submittals promptly. A reasonable time should be allowed for the Engineer's review and processing of Submittals, the Contractor's revisions and resubmissions of Submittals, and the Engineer's review and returning the approved Submittals to the Contractor.

10. It is the Contractor’s responsibility to review and confirm compliance with the contract documents prior to submitting each submittal. Any delays, due to the quality of submittals requiring multiple cycles for review and approval, will be the responsibilities of the Contractor.

F. Approval of Submittals not a Waiver

1. The approval of a Submittal shall not constitute a waiver of any of the requirements of the Contract nor shall the City be compelled to accept any Work unless it passes all the tests and requirements specified in the Contract Documents.

2. All deviations made during construction from final Shop Drawings previously annotated by the Engineer "Furnish as Submitted", shall be corrected on the Shop Drawings, and resubmitted to the Engineer showing conditions as constructed.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

ATTACHMENT 01 33 00-1
SAMPLE SCHEDULE OF SUBMITTALS

Submittal Number:		Name:	Review Cycle:	Date Submitted:	Date Returned:	Disposition:

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section includes, but is not limited to, the development and enforcement of a Diving Operations Manual and a Dive Plan.

B. At a minimum, Work is expected to require diving support services for all underwater construction activities, including but not limited to the following: HLRT foundation preparation, placement of Fill, drilling and grouting of anchors, placement of concrete forms, placement of concrete and concrete accessories, erection and removal of steel cofferdam, installation of steel framework, and visual inspection.

C. All diving performed shall be in strict accordance with 29 CFR Part 1910, 29 CFR Part 1915, the U.S Army Corps of Engineer EM 385-1-1, Section 30; and ER 385-1-86, Association of Diving Contractors (ADC) Consensus Standards for Commercial Diving Operations and other applicable federal, state and local codes and laws.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	SUMMARY	1
1.02	PAYMENT	2
1.03	RELATED SECTIONS	2
1.04	REFERENCES	2
1.05	DESCRIPTION	2
1.06	QUALITY ASSURANCE	2
1.07	SUBMITTALS	2
1.08	DELIVERY, STORING AND HANDLING	6
1.09	SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES	6
1.10	WARRANTY	6
PART 2	PRODUCTS	6
2.01	MANUFACTURERS	6
2.02	MATERIALS / EQUIPMENT	6
2.03	FABRICATION / ASSEMBLING / FINISHES	7
2.04	SOURCE QUALITY CONTROL / SHOP TESTS	7
PART 3	EXECUTION	7
3.01	EXAMINATION / PREPARATION	7
3.02	INSTALLATION	8
NOT USED		8
3.03	FIELD TESTING / QUALITY CONTROL	8
3.04	STARTUP / DEMONSTRATION	8

DIVE TEAM CREW REQUIREMENTS: THE FOLLOWING DIVE TEAM MEMBERS ARE REQUIRED AS THE MINIMUM CREW MANNING LEVELS: 8
3.05 ADJUSTING / PROTECTION / CLEANUP 9

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 02 68 00 – Work on Reservoir and Diversion of Water

C. Section 31 23 23 – Fill

1.04 REFERENCES

A. U.S. Army Corps of Engineers (USACE):

1. EM 385-1-1 Safety and Health Requirements Manual (latest rev.)

2. ER 385-1-86 Engineer Regulation, Government Personnel Diving Operations (latest rev.)

B. U.S. National Archives and Records Administration (NARA):

1. 29 CFR Part 1910 Occupational Safety and Health Standards (latest rev.)

2. Safety and Health Standards Applicable to Shipyard Employment (latest rev.)

1.05 DESCRIPTION

A. Not Used.

1.06 QUALITY ASSURANCE

A. Not Used.

1.07 SUBMITTALS

A. The following shall be submitted in accordance with the submittal procedures for this contract.

B. Diving Operations Manual:

1. Submit for review, at least 30 days prior to operations, a Diving Operations Manual, which shall depict the Contractor's general plan for accomplishing the diving operations. The Diving Operations Manual shall include the following information as a minimum:

   a. A complete copy of 29 CFR Part 1910, Subpart T and the Contractor's proposed method of complying with each of its pertinent parts.

   b. Provide copy of relevant no-decompression and/or decompression schedules required to conduct work proposed. Deeper work may require use of modes other than 'air diving'.

   c. A sample of the Diving Log sheets to be used.

   d. A sample of the Repetitive Dive Worksheets or equivalents (dive profile method) to be used.

   e. An outline of emergency communications between the dive site and the Contractor's project office (located at the job site); Contractor-furnished portable radios, hardware, telephone hookup, etc.

   f. Emergency assistance information, including location, telephone numbers, and names of nearest doctor, hospital, emergency ground and air transportation, recompression facilities, and other appropriate medical assistance.

   g. An Activity Hazard Analysis (AHA) Plan, setting forth potential hazards, means of prevention, and actions to be taken should an accident involving the potential hazard occur. Minimum coverage in the AHA shall include; means of prevention and procedures for dealing with fire, equipment failure, and adverse environmental conditions, drowning, air embolism, decompression sickness, traumatic injury, hypoxia, carbon dioxide excess, carbon monoxide excess, strangulation, various types of squeezing, fouling or entanglement, mechanical injury, overexertion/exhaustion, hypothermia, hyperthermia, currents caused by hydraulic differential through the structure, and electrocution and blowup of dry suits.

   h. An outline of pre-dive briefings and equipment checkout procedures for daily diving activities

   i. An outline of qualifications and experience and experience requirements for the dive team members. As a minimum, each team member shall have at least one year of commercial experience in the applicable position; divers shall have completed at least four working dives to the depths required, using the particular diving techniques and equipment to be used. Divers shall demonstrate that at least one of the

four qualification dives was performed in the last six months prior to the contract award date.

j. An outline of the medical qualifications required for divers to be employed. As a minimum, each diver shall meet the certification requirements specified in 29 CFR Part 1910, Subpart T, and EM-385-1-1, Section 30.

k. An outline of diving equipment, maintenance procedures and certification of analysis of air output for diving air supply compressors to be used. As a minimum, the equipment maintenance shall indicate method of testing, frequency, and repair methods used. Diving air supply compressors output air shall be volume, carbon dioxide – 1,000 ppm maximum, carbon monoxide – 20 ppm maximum, total hydrocarbons – 25 ppm maximum, particulates – 5 mg/cubic meter maximum, and have no objectionable odor.

l. An outline of administrative and record-keeping procedures. As a minimum, the outline shall contain (by title of position) job responsibilities, the chain of command, daily briefing and diving safety orientation procedures, log and diving related record-keeping responsibilities, equipment maintenance and pre-dive equipment checklist, etc.

C. Dive Plan: Submit for review, at least 30 days prior to operations, a Project/Task Specific Dive Plan prior to any actual dive task or assignment. The Dive Plan shall include the following information as a minimum:

1. Contractor Name.
2. Contract Number.
3. Dive Plan submission date.
4. Name of diving supervisor preparing the Dive Plan.
5. Description of proposed work and diving mission.
6. Approximate time and date dive will start.
7. List of diving equipment to be used.
8. Name and type of diving platform to be used.
9. Planned depth of dive and maximum depth to bottom.
10. Maximum single dive bottom time for the planned depth of dive for each diver.

11. Surface and underwater conditions, including visibility, temperature, thermal protection and currents.

12. Lockout/tagout procedures, including procedures for dealing with differential pressures.

13. List of all tools or equipment to be used.

14. List of materials to be handled or installed.

15. List by name of each dive team member. The first time each diver is employed on the job, the Contractor shall attach to the Dive Plan a qualification statement and copy of the diver's current medical record, giving the physician's written report and opinion of the diver's fitness for exposure to hyperbaric conditions, including any limitation to such exposure. The required qualifications shall be in accordance with EM 385-1-1. Diver's qualification statement and medical record need not be attached to subsequent Dive Plans unless a diver's medical report has expired and a new medical report has been submitted.

16. List by name each person directly involved in topside assistance/support to the dive team.

17. List of information and equipment required at the dive site. The following information and work materials shall be available at the dive site as a minimum, either referenced in the Diving Operations Manual or work materials furnished by the Contractor: Diving Log Sheets; Repetitive Dive Worksheets; Table of No-Decompression Air Dives between the dive site and the Contractor's project office, the Dive Coordinator/Dive Inspector; stop watch or equivalent, as required to monitor times for each diver; standard first aid supplies; litter or tilt board and a manual resuscitator capable of administering oxygen; portable VHF marine band radio as required.

18. List of information required at the dive site and the project office; local emergency medical assistance names, locations, and telephone numbers for ambulance service, hospital, and doctor, emergency medical evacuation assistance for ground and/or air transportation facilities with point of contact names, location and telephone numbers; nearest emergency medical facility with hyperbaric chamber capable of recompression equivalent to 165 feet of water, with point of contact names, location and telephone numbers.

19. The Dive Plan shall contain the following statement: "If for any reason the Dive Plan, as approved, is altered in scope, depth, personnel, or equipment, the Resident Engineer shall be contacted within 24 hours in order to review the proposed Dive Plan revisions prior to the actual diving operation."

D. Submit within 24 hours of an accident, copies of all accident reports including injury to divers and other persons associated with the diving to the Resident Engineer.

E. Air Quality Certifications: Submit for review, at least 10 days prior to any diving operations, Air Quality Certifications for accomplishing the diving operations required. The Air Quality Certification shall be reviewed by the Resident Engineer prior to commencing any diving operations.

F. Daily Logs: Submit each day, to the Resident Engineer, complete copies of the previous day's Diving Log Sheets and any other work sheets prepared in conjunction with the Diving Log Sheets.

G. Documentation of Diving Work: Submit at the completion of diving work documentation of work performed, in the form of photographs and videotape (conforming with Section 01 32 30 – Job Photographs and Videos), supplemented by sketches and drawings as appropriate.

1.08 DELIVERY, STORING AND HANDLING

A. Not Used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used.

1.10 WARRANTY

A. Not Used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used.

2.02 MATERIALS / EQUIPMENT

A. Contractor shall provide all equipment and tools necessary to ensure expedient completion of the Work and complete safety of the dive team.

B. Tools: Contractor shall provide all tools for underwater work. Tools shall comply with all government regulations and commercial standards for both workplace safety and prevention of water supply contamination.

C. Equipment Testing:

1. All equipment and tools necessary for underwater work operations shall be tested and verified to be in proper working condition prior to the start of each diving operation by qualified Contractor personnel.

2. All equipment tests shall be performed in the presence of the Engineer.

3. Contractor will be allowed to make all necessary modifications to equipment that is not in satisfactory working condition. Such equipment shall be re-tested after completion of all modifications. If the equipment is still not in satisfactory working condition, all underwater operations shall cease until such equipment can be repaired to satisfactory working condition, or replaced.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Contractor shall provide their own electric power, lighting, communication and life support equipment for all underwater operations.

B. Potable water shall be used for disinfection of all diver's dress, equipment and tools prior to entrance into the water. There is not potable water available at the site.

C. All diving activities shall be conducted with full knowledge and close coordination with the Resident Engineer and Dive Coordinator. Divers shall not enter the water or move from prescribed location without the acceptance of the Dive Inspector or Dive Coordinator.

D. Prior to the dive and at the scene of the dive, the Contractor shall meet with the Resident Engineer and shall verify, as a minimum, the following pre-dive checks are performed:

1. All diving equipment shall be checked for proper function prior to diver entry.

2. All necessary safety equipment specified hereinbefore are on site and functioning properly.

3. Lockout/tagout procedures are followed and the Diving Supervisor is in possession of the key or keys.

4. Crane signals are reviewed and radio communications with the crane operator is functioning properly, when applicable.

5. Welding or cutting procedures are clearly reviewed, the proper welder polarity is set and precautions have been taken to avoid electrocution.

6. A pre-dive briefing shall be given which includes but is not limited to, the accident management plan, activity hazards analysis, equipment check list, diving logs, diving conditions, and diving procedures.

E. Documents Availability: One copy of the approved Diving Operations Manual (to be kept on-site in the Contractor's job trailer) and one copy of the approved Dive Plan shall be available at the dive site while diving operations are underway.

F. Disinfection: The intent of this Article is to prevent contamination of Schoharie Reservoir with the Zebra Mussel or any other form of aquatic life deemed detrimental to the operations of the NYCDEP's facilities or that may threaten the water supply quality.

1. Prior to commencement of the diving operations, all equipment, tools, and divers' dress entering the water shall be disinfected by steam cleaning.

2. All divers' dress shall be disinfected with a sodium hypochlorite solution.

3. All equipment and tools entering Schoharie Reservoir shall be disinfected by method of steam cleaning. There is no potable water on-site for the Contractor's use.

4. Disinfection procedures shall take place at a location approved by NYCDEP. Disinfection of all divers' dress, tools and equipment and shall be witnessed and approved by a representative of NYCDEP.

5. The Contractor's attention is directed to the provisions of Section 01 14 00 – Work Restrictions, including but not limited to Article 1.05.G, Water Quality Restrictions and Article 1.05.I, Reservoir Restrictions, which will be enforced for the diving work performed under this Section.

3.02 INSTALLATION

Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not used.

3.04 STARTUP / DEMONSTRATION

1. Dive Team Crew Requirements: The following dive team members are required as the minimum crew manning levels:

2. Comply with EM 385-1-1, Appendix O, Table 0-3.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 35 27 – ENVIRONMENTAL, HEALTH AND SAFETY REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for the Contractor to provide its employees and its Subcontractors a safe and healthful work environment and for performing all Work in compliance with all applicable environmental health and safety (EHS) laws, rules, and regulations.

1. The EHS performance of the Contractor and its Subcontractors is the responsibility of the Contractor. Since effective on-site management is essential for EHS performance, the Contractor shall evaluate the performance of its on-site EHS team on a continuous basis. Where deficiencies are found, the Contractor shall take appropriate action including removal of its personnel or its Subcontractors' personnel.

B. Attachments

1. Exhibit A – Standard Environmental, Health and Safety Requirements Specifications

2. Exhibit B – Bidder's EHS Safety Record and Program Review Questionnaire

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	14
1.03	Related Sections	14
1.04	References	14
1.05	Description	15
1.06	Quality Assurance	20
1.07	Submittals	22
1.08	Delivery, Storage, and Handling	27
1.09	Spare Parts, Special Tools, and Supplies	27
1.10	Warranty	27
PART 2	PRODUCTS	27
2.01	Manufacturers	27
2.02	Materials / Equipment	28
2.03	Fabrication / Assembling / Finishes	28
2.04	Source Quality Control / Shop Tests	28
PART 3	EXECUTION	28
3.01	Examination / Preparation	28
3.02	Application	32
3.03	Field Testing / Quality Control	32

3.04 Startup / Demonstration 33
3.05 Adjusting / Protection / Cleanup.....34
EXHIBIT A.....35
36

2. Pre-Award

2.1 Contractor Safety Record Submittals

Within 5 business days of DEP request, the apparent low bidder shall provide the information specified below. Failure to provide the required information may result in a rejection of the bid.

2.1.1 NY Intrastate Experience Modification Rating (EMR) for past 3 years.

Bidder shall provide its NY Intrastate EMR for the past 3 years on its insurance broker's letterhead. EMR information provided by the New York State Insurance Rating Board is also acceptable. If the bidder does not have a NY Intrastate EMR, its out-of-state EMRs shall be submitted. DEP may also request a company's Workers Compensation Loss Runs to verify EMR.

Bidders that do not have an EMR shall provide, for the past 3 years, their: (a) Workers Compensation Loss Runs (this information shall be provided by their insurance broker); (b) OSHA Total Recordable Cases (TRC); and (c) Days Away, Restricted, or Transferred (DART) rates.

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

Bidders are expected to have an EMR of 1.0 or below. If a bidder's EMR is greater than 1.0 in any single year within the 3-year period, the bidder shall submit the following:

- An explanation and supporting documentation explaining why the EMR is greater than 1.0 and detailed steps that have been taken to improve the bidder's EHS performance.
- Five years of Workers Compensation Loss Runs (this information shall be provided by the insurance broker) and documentation of payroll during that same period.
- For each indicated loss, the bidder shall provide a summary of the loss facts and investigation, including a summary of corrective actions undertaken and modifications or development of EHS programs.
- If the bidder has been notified by the New York Compensation Insurance Rating Board (NYCIRB) within the past 3 years that they must participate in the Industrial Code Rule 59, Workplace Safety and Loss Prevention, program then the bidder shall provide a copy of their Consultation Report from a Certified Consultant, documentation of the implementation of the Report identified

37

corrective action(s) and recommendation(s), and a copy of the carrier required re-inspection. If the bidder elected to instead receive a worker's compensation premium surcharge, they shall so indicate.

2.1.2 Last 3 years of OSHA 300 Forms (Logs of Work-Related Injuries and Illnesses) and/or 300A redacted summary worksheets (as available, to verify accuracy of information provided).

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

If a bidder's EMR is greater than 1.0, the bidder shall submit their OSHA 300A redacted forms for the entire period covered by the work loss runs indicated in Section 2.1.1 above.

2.1.3 List of all federal, state and local regulatory agency (e.g., OSHA, NYSDEC, USEPA, USDOT, DEP, FDNY and NYCDOB, etc.) notices of violation, notices of deficiencies, and fines issued/received in the past 3 years; the letter listing these (or stating that no notices of violation, notices of deficiencies, and no fines have been issued/received in the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.4 List of reportable releases of chemical or petroleum products associated with the bidder's operations during, at a minimum, the last 3 years; the letter listing these (or stating that no reportable releases associated with the bidder's operations have occurred during the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.5 A written description of the bidder's EHS programs (and associated training), including any EHS programs and procedures employees will be required to follow while providing labor or services for DEP. Upon request by DEP, the bidder shall also provide a protocol for the EHS evaluation of any subcontractors that could be proposed by it for DEP approval.

2.1.6 A sworn, notarized certification from a principal or officer that, if the bidder is awarded the Contract, its EHS programs shall meet all OSHA, USEPA, NYS and local regulations, and the bidder shall abide by applicable DEP policies and procedures, as appropriate, and as provided by DEP. (Refer to Bidder's EHS Performance and Program Review Questionnaire/Checklist that is included with the bid submission materials in the Invitation for Bids package).

2.1.7 For bidders that are joint ventures, the above information must be provided and will be reviewed for the joint venture itself and the individual joint venture partners.

38

2.2 Responsiveness

The items submitted under 2.1 will be evaluated as the contractor's safety record. Further, the bidder's EHS submittals and training program descriptions must indicate that the bidder:

- understands its regulatory requirements
- has a proactive and acceptable EHS and training program in place
- has performed acceptably on prior DEP projects as applicable.
- has adequate EHS professionals available for the project
- has demonstrated an acceptable safety record for the time periods reviewed.
- has demonstrated an acceptable safety record on similar projects over the past three years; and
- has certified that its program and training comply with all regulatory requirements.

3. Proposed Subcontractors

3.1 The subcontractor approval process requires an information submittal that includes the proposed subcontractor's EMR, EHS program descriptions and certifications like those in sections 2.1 and 2.2.

3.2 The standards listed in Section 2.2, above, shall also apply to the approval of proposed subcontractors that would be performing a significant volume or aspect of the project.

4. Contractor Orientation

4.1 Prior to commencing any work at any DEP location, the Contractor shall be required to attend an orientation. After attending the initial orientation, the Contractor shall, in turn, provide an orientation to any of the Contractor's employees assigned to work at the DEP location. This training must also be provided to subcontractors, suppliers[1], and Contractor visitors who will be onsite.

4.2 During orientation, DEP will provide the Contractor with the most current:

4.2.1 Work site-specific hazardous conditions and related information (e.g., hazardous chemicals present at the work site, locations of Safety Data Sheets, and required safe work practices including minimum Personal Protective Equipment (PPE) requirements);

4.2.2 Facility-specific lockout/tagout requirements;

[1] This requirement does not apply to suppliers providing services or products that are determined by the Bureau administering the Contract to have little likelihood of affecting DEP employee safety, property, the public, or the environment.

39
40

5. Requirements During Work

5.1 When and where required by the DEP Bureau of Police and Security, the Contractor, and its subcontractors, and all their respective employees shall, always when working at the site(s), wear photo-identification badges.

5.2 The Contractor shall develop a work plan that identifies and addresses safety hazards and environmental requirements prior to starting any work.

5.3 PPE must be utilized in accordance with the work plan.

5.4 The Contractor and its subcontractors and all their respective employees shall, upon request, produce certificates, licenses, and other documentation that laws or regulations require them to obtain them to conduct activities they are performing (e.g., Asbestos Worker Certificate, FDNY Certificate of Fitness in New York City).

5.5 The Contractor's and its subcontractors' employees are restricted from entering all high-hazard process areas unless access is required to perform their work. In coordination with the Contract Supervisor, the Contractor or subcontractor employees entering such process areas must obtain permission from the on-duty operator or supervisor in person or by the telephone before entering these areas. Further, Contractor or subcontractor employees must inform the on-duty operator or supervisor in person or by telephone upon leaving and follow all other facility access control procedures.

5.6 Any worker who fails to abide by the EHS requirements presented in the safety orientation shall, at the sole discretion of the DEP, be denied access to the facilities and shall be replaced by the Contractor, as directed by DEP.

5.7 The Contractor shall immediately inform the DEP Contract Supervisor and the facility's most senior manager of all incidents and all near misses; and of any notices of violation (NOVs), notices of deficiencies (NODs), and fines issued by and/or received from regulatory agencies resulting from work performed. Initial written reports shall be submitted by the next day. Note that other specification sections in this Contract may include additional investigation and reporting requirements and must be consulted. The more stringent requirements will apply in the event of any conflict.

5.7.1 The Contractor must close out all NOVs, and all other violations/deficiencies, and pay the appropriate fines before final or subsequent payments can be made by DEP. The Contractor will not receive final payment if there are open violations or notices of non-compliance.

6. Evaluations of Contractor EHS Performance

6.1 DEP will perform evaluations of the Contractor's performance to ensure compliance with all EHS laws and regulations and DEP and facility EHS requirements. Such

41

evaluations will be considered when evaluating the Contractor's bids for future contracts.

6.2 The Contractor shall be rated on each category shown on the Contractor EHS Evaluation form a copy of which should be provided to the Contractor by the Contract Supervisor. ("NA" is acceptable where the requirement was not applicable). The Contract Supervisor may include other specific EHS categories under "Other" that are of particular importance to the project. The Contract Supervisor shall inform the Contractor prior to commencement of work when this is the case.

6.3 DEP considers compliance with and conformance to EHS requirements to be of the utmost importance, and recognizes that, on particular projects, the importance of compliance with certain requirements may carry more weight than others, as failure to comply may present a greater level of risk. The final rating for the job in such a case may be weighted more heavily on specific categories (one or two) if compliance with that/those program requirement(s) is paramount to worker safety and/or environmental protection. In this case, the Contractor shall be notified prior to the commencement of work or through the development of risk-based safety plans during the project.

6.4 The following rating scale shall be utilized in conducting the Contractor evaluations:

Excellent – Contractor exceeded EHS contractual, policy, and/or regulatory requirements. Work was accomplished with no observed deficiencies and no violations. Contractor proactively and effectively addressed potential risks. Contractor demonstrated EHS leadership and best practices and showed alignment with DEP's EHS goals.

Good – Contractor met or exceeded most EHS contractual, policy, and/or regulatory requirements. Work was accomplished with limited or minor observed deficiencies or minor violations. Correction and preventative actions taken by the Contractor were timely and effective.

Fair – Contractor met EHS contractual, policy, and/or regulatory requirements. Observed deficiencies or violations were satisfactorily corrected and did not indicate a pattern of repetition. The correction and preventative actions taken by the Contractor were completed in a timely manner.

Poor – Contractor did not meet some EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but the Contractor either did not identify corrective and preventative actions or proposed correction and preventative actions that appeared to be only marginally effective.

Unsatisfactory – Contractor did not meet a significant number of EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but Contractor did not develop a Corrective and Preventative Action Plan, or failed to implement a Corrective and Preventative Action Plan, or implemented an unsuccessful Corrective and Preventative Action Plan. Deficiencies and/or violations indicated a pattern of repetition.

42

6.5 A Contractor that disagrees with an overall evaluation of "Poor" or "Unsatisfactory" can submit a written request for reconsideration to the DEP Contract Supervisor within 10 business days after receipt of the written evaluation. The request for reconsideration must set forth all the relevant information and arguments and be accompanied by any documentation relied on in support of the request. The request for reconsideration will be reviewed by the Deputy Commissioner overseeing the Bureau or his or her designee. The Deputy Commissioner or designee will notify the Contractor of the determination of the request in writing. Such determination will be final.

6.6 If its evaluation (other than the final evaluation) is "Poor" or "Unsatisfactory," the Contractor must prepare a Corrective and Preventive Action Plan to correct and prevent recurrence of the deficiencies identified through the evaluation.

* * * * * *

43
EXHIBIT B 44
BIDDER'S EHS SAFETY RECORD AND PROGRAM REVIEW 44
QUESTIONNAIRE 44

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment

1.03 RELATED SECTIONS

A. Section 01 57 16 - Temporary Pest Control

B. Section 02 24 20 – Soil Sampling and Analysis

C. Section 02 68 00 – Work on Reservoir and Diversion of Water

1.04 REFERENCES

A. Definitions

1. "Competent Person" means one who is capable of identifying existing and 35 27predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees or the environment, and who has authority to take prompt corrective measures to eliminate them. A Competent Person has stop work authority.

2. "EHS Resources" shall mean the Contractor's EHS Professional(s) and its EHS Site Representative (EHS Rep), as approved by the BEDC EHS unit. This definition shall also apply to the Subcontractors' EHS Resources, where required. This definition also includes any consultant or other EHS personnel associated with the Project. Such EHS personnel are subject to evaluation and approval by BEDC EHS as set forth in this Section.

3. "Environmental Health & Safety Plan (EHASP)" shall mean the plan developed in accordance with all applicable EHS rules and regulations and these Specifications to identify and set forth policies and procedures to control the health and safety concerns and environmental impacts known and unknown at the Site. This plan is not to be confused with the Health and Safety Plan that may be required under 29 CFR 1910.120 for Hazardous Waste Operations and Emergency Response (HAZWOPER).

4. "Job Hazard Analysis" (JHA) shall mean a tool used to document a process by which the steps required to accomplish a work activity are outlined, the actual or potential hazards for each step are identified, and measures for the elimination or control of those hazards are developed.

5. "Hazard Identification" shall mean an existing condition that has the potential to harm people, cause damage to property or the environment, or some combination of these.

6. "Incident" shall mean an undesired occurrence that resulted in injury, illness, environmental release, fire, explosion, motor vehicle event, property damage, equipment failure, non-compliance, and/or adverse impact to operations/work.

7. "Near Miss" shall mean an undesired event in which no property or environment was damaged and no personal injury (i.e., work related harm, damage or loss to a person, including first aid cases as well as recordable injuries) was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred.

8. "Observation" shall mean an opportunity to improve that does not entail an event included as a hazardous identification, near miss, or incident.

9. "Qualified Individual" shall mean one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve or resolve problems relating to the subject matter, Work or Project.

B. Reference Standards

1. 29 CFR 1926 - Safety and Health Regulations for Construction (Subpart Z – Toxic and Hazardous Substances), Standard No. 1926.1153 - Respirable Crystalline Silica

1.05 DESCRIPTION

A. General

1. In performing the Work of this Contract, the Contractor shall at all times be in compliance with all federal, state, City and local environmental, health and safety laws, rules, regulations, DEP Policies and BEDC EHS Standards.

2. The Contractor shall ensure that its employees and those of its Subcontractors working on a DEP project site under the Contract are clearly identifiable as Project Contractor employees. This may include the use of labeled safety vests or hard hats or other acceptable means in addition to complying with the identification badge requirements of Article 37 of the Standard Construction Contract. All on-duty employees and those of its Subcontractor issued DEP identification badges must visibly wear the badge at the waistline or above. The Contractor must supply a safe means for wearing badges such as break away lanyards or where the badge may be a safety hazard during the scope of Work, an exemption to wearing the badge will be made as approved by the EHS Regional Manager (RM).

Exemptions will be documented in the EHASP and JHA for the specified work activity.

3. The Contractor shall be responsible for the health and safety of its employees, Subcontractors, the public and all other persons at or around the Work Site. The Contractor shall be solely responsible for the adequacy of all construction methods, materials, equipment and the safe and environmentally compliant prosecution of the Work. Where possible, the Contractor shall implement Best Management Practices to reduce injuries, accidents and environmental impacts.

4. The overall site management for EHS is performed by the Engineer in coordination with the DEP Construction Manager. The Construction Manager's EHS staff/consultant and Contractor's EHS staff shall work closely with the Engineer's designated EHS staff (i.e., coordinate to perform joint EHS activities, including inspections, incident investigations, etc.). The Contractor shall coordinate with the Engineer's EHS designee with regard to any Site rules or Site-specific requirements such as working hours, delivery times and operations coordination and sequencing.

5. The Contractor shall perform and document its due diligence in determining whether the Subcontractors it hires to perform Work under the Contract are capable of performing to the EHS standards set forth in this Section. At a minimum, the Contractor is required to perform an EHS evaluation of proposed Subcontractors prior to submitting them for DEP approval. The Contractor must have a Subcontractor EHS evaluation program that is at least as stringent as the DEP Contractor Selection and Management Policy available in the BEDC web-based PMIS. Poorly performing Subcontractors will affect the Contractor's performance evaluations and ability to obtain future contracts with DEP.

6. DEP requires a drug and alcohol free, healthful, safe and secure work environment. Contractor employees will report to work in an appropriate mental and physical condition for work. DEP reserves the right to require any Contractor or Subcontractor employee to submit to drug testing when cause for reasonable suspicion of a violation of this policy exists. Drug testing may occur when: a) there is reasonable suspicion that an employee is under the influence of alcohol or illegal drugs, or b) an employee has been in involved in an Incident, or involved in an unsafe practice, or c) as required by BEDC EHS Standards. The Contractor must prohibit any employee from being under the influence of any illegal drug or alcohol while at work, on duty, or operating a vehicle or construction equipment.

7. The Contractor shall implement an EHS Management Program which includes qualified Safety Professionals (SPs) and Environmental Professionals (EPs), collectively referred to as EHS Professionals, along with project management staff, with appropriate competencies to provide

EHS direction, guidance, and oversight of all aspects of the performance of the Contract's detailed scope of Work.

8. The Contractor shall ensure that its EHS Resources have appropriate authority to execute their duties and responsibilities as set forth in this Section and under the Contractor's EHS Management Program.

9. The Contractor shall arrange for additional approved EHS Resources to be available during EHS staff absences. The Contractor must inform the Engineer, in writing, of anticipated absences.

10. Contractor EHS Resources:

    a. At a minimum, the Contractor shall provide the EHS Resources described below. The Contractor is required as part of its EHS Management Program to identify any EHS Resources necessary beyond the listed minimums.

    b. For all contracts that employ 100 or less employees on site at any time, the Contractor shall have at least one full-time site EHS Rep. The Contractor may submit a request in writing to the Engineer to waive the requirement of a separate EHS Rep at each site and permit other Contractor employees who are Qualified Individuals to monitor the EHS activities of the employees and to assume all of the responsibilities of the full-time site EHS Rep, if it can show that one EHS Rep can effectively manage multiple sites. The EHS Rep(s) shall have no other duties except those related to EHS on the Contract, and shall not be the project manager, engineer, superintendent or have any other title or project role other than EHS Rep.

    c. For all contracts that employ over 100 employees on site at any time, the Contractor shall have at least two full time EHS Reps. These EHS Reps shall have no other duties except those related to EHS on the Contract, and shall not be project managers, engineers, superintendents or have any other title or project role other than EHS Rep.

    d. The Contractor may submit a request in writing to the Engineer to waive the requirements of this Section and permit other Contractor employees who are Qualified Individuals to monitor the EHS activities of the employees on site and to assume all of the responsibilities of the full-time EHS Rep.

    e. The Contractor shall ensure that Subcontractors who consistently employ over 100 employees for more than two weeks at a time under the Contract shall have one full-time site EHS Rep. This EHS Rep shall have no other duties except those related to EHS on the Contract and shall not be the Project Manager, Engineer,

superintendent or have any other title or project role other than as the Subcontractor's EHS Rep.

f. If the Contract has more than one location, each location shall be treated as a separate contract for purposes of determining the number(s) of necessary EHS Reps in accordance with paragraphs b through d above.

g. The Contractor's EHS staff shall be provided an appropriate office on the Project Site to maintain and keep available EHS records, up-to-date copies of all pertinent EHS laws, rules, regulations and governing legislation, material safety data sheets, and the EHASP.

11. All site workers have the right to refuse unsafe work which is reasonably believed to present imminent danger to their own safety or the safety of others, the public or the environment, or to City property, without adverse consequences.

12. The Contractor and its Subcontractors shall stop Work and initiate immediate corrective action whenever a Work procedure or a condition at the work site is deemed unsafe by the EHS staff, DEP, Competent Persons, or the Engineer. All Contractor and Subcontractor employees working on site shall report any unsafe or noncompliant work condition(s) immediately to the EHS staff, Competent Persons, or the Engineer. If a stop Work order is issued to the Contractor by the Engineer for unsatisfactory EHS performance, the Contractor shall not make any claim against the City for any losses associated with the stop work order.

13. The Contractor and all Subcontractors are responsible for daily cleanup of their immediate Work areas in accordance with BEDC's Housekeeping Standard. Construction scrap and debris shall be removed daily during the course of construction, alterations and repairs. Contractor refuse shall not be allowed to accumulate so as to create trip hazards or block access routes and pathways. The Contractor shall implement procedures to ensure a high standard of housekeeping. All waste shall be disposed of in accordance with the appropriate regulations and applicable Specifications.

14. The Contractor shall ensure that any sand, soil, plaster, cement, mortar or the like is not deposited or washed into any drain or sewer unless specifically authorized under required permits.

15. When working with (i.e. the cutting, grinding, drilling, chipping, demolition/removal) masonry materials containing respirable crystalline silica (i.e. brick and concrete), the Contractor shall perform work utilizing specified engineering and work practice control methods in accordance with 29 CFR 1926.1153.

B. Environmental Health and Safety Plan (EHASP)

1. The Contractor shall have a written EHASP prepared and signed by both the SP and the EP in accordance with the BEDC EHASP Standard. The EHASP must be signed by a principal or senior manager of the company and project management staff. The EHASP shall be submitted to BEDC for review and approval prior to the start of any work. JHAs will be developed as the Work progresses, in accordance with the BEDC JHA Standard, and will supplement the Contractor's EHASP.

C. Emergency Action Plan

1. The Contractor shall work with the Construction Manager and Other Contractors to develop a single cohesive construction EAP in accordance with BEDC's EAP Standard.

a. The Contractor is responsible for providing or supplementing the facility's existing, emergency alarm/siren/annunciation system to ensure that all Contractor personnel will be adequately notified of an alarm condition or required/test evacuation.

b. The Contractor is responsible for evaluating and ensuring that all identified emergency resources are adequate and appropriate for the potential rescues/emergencies needed.

D. Spill Prevention Program (SPP)

1. The Contractor shall establish a Spill Prevention Program (SPP) for the prevention of releases of petroleum, hazardous substances or other pollutants. The SPP shall be included in the EHASP, and include awareness training for all personnel on measures designed to reduce, minimize and eliminate the potential for releases.

2. The Contractor shall establish sound work practices and implement appropriate measures to achieve release prevention and control of releases when they do occur.

3. Section 1.07 Submittals lists the requirements of the SPP.

4. Facilities or construction sites with chemical bulk storage (CBS) tanks or containers registered with the New York State Department of Environmental Conservation (DEC) are required to have a Spill Prevention Report (SPR) as per 6 NYCRR 598(1.9).

5. The Contractor shall bear sole responsibility for all costs and delays resulting from any releases on the Project which occur as a result of the work activities.

E. Spill Prevention, Control, and Countermeasure (SPCC) Plan

1. Facilities or construction sites that will store, handle, or manage a combined aboveground storage capacity of 1,320 gallons of oil, or a completely buried oil storage capacity of over 42,000 gallons, are required to have an SPCC

Plan. Contractors shall follow 40 CFR part 112 Oil Pollution Prevention Regulation to determine if their project site qualifies for an SPCC Plan. All SPPC Plans require the certification of a Professional Engineer (P.E.). Section 1.07 Submittals lists the requirements for SPCC Plans.

1.06 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall ensure that, at all times, its employees and those of its Subcontractors have received OSHA 10-Hour Construction training or OSHA 30-Hour training within the last five (5) years.

2. The EHS Professional(s) shall possess a combination of safety and environmental skills as needed to manage the EHS hazards and issues presented by this Project. The EHS Professional may be one or more persons meeting the individual qualifications for Safety and Environmental Professionals as detailed below.

3. Safety Professional (SP): Persons recognized as an SP shall, at a minimum, possess the following education and experience:

   a. Certification as a Certified Safety Professional granted by the Board of Certified Safety Professionals and five (5) years of documented professional construction EHS management experience; or

   b. Certification as a Certified Industrial Hygienist granted by the American Board of Industrial Hygiene and five (5) years of documented professional construction EHS management experience; or

   c. A Bachelor of Science degree in safety, industrial hygiene, occupational safety and health, environmental health and science, or related field and ten (10) years of documented professional construction EHS management experience.

   d. All documented professional EHS management experience must be in the types of construction and conditions expected to be encountered on the site.

   e. For projects that require hazardous waste remediation or response, the SP is also required to have successfully completed a forty-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course.

4. Environmental Professional (EP): Persons recognized as an EP shall, at a minimum, possess the following education and experience:

   a. A Bachelor's degree in environmental science, environmental engineering or other related engineering or science field and ten (10)

years of documented professional environmental field, management and/or engineering experience. All documented professional environmental experience must be in the types of construction and conditions expected to be encountered under this Contract.

b. The EP's knowledge and experience should include, but not be limited to, management and disposal of solid and hazardous waste, universal waste, hazardous materials management, chemical and petroleum bulk storage, used oil, chemical and petroleum spill control plans, lead/mercury/PCB and asbestos remediation and management, storm water and soil management, and environmental permit management.

c. Where required for soil sampling plans and determining soil classifications the EP shall meet the NYSDEC definition for a Qualified Environmental Professional (QEP). In addition, when soils are excavated for onsite or offsite reuse in NYS, the QEP shall be present onsite to monitor contractor compliance with soil management plans, such as the Field Sampling Plan and Soil Excavation, Reuse, Transport and Disposal Plan (SERTD Plan) specified in 02 24 20 – Soil Sampling and Analysis.

5. EHS Rep: Qualifications of the EHS Rep(s) shall include a minimum of: ten years of relevant construction experience, five years of which were exclusively in construction EHS management and successful completion of the following training courses:

a. BEDC EHS Standards;

b. Thirty-hour OSHA construction safety and health training;

c. For projects that require hazardous waste remediation or response, forty-hour HAZWOPER training;

d. Resource Conservation Recovery Act/DOT hazardous waste/manifesting training

e. Permit- required confined space;

f. BEDC spill prevention and control and

g. Control of hazardous energy sources (lockout/tagout)

6. The EHS Professionals (SP, EP, or both) and EHS Rep shall have extensive experience with hazard identification, evaluation and controls, and be knowledgeable of all applicable EHS requirements set forth by governing laws, rules and regulations as well as Best Management Practices. Where gaps in the training or experience are identified, DEP may require additional experience or training for approval.

B. Performance Evaluations

1. The Contractor, in conjunction with its Subcontractors, shall be evaluated semi-annually on their performance in implementing the Work of this Contract in accordance with this Section and all related EHS specifications, rules, regulations, laws, policies and procedures. The evaluations are based on the criteria established in DEP's Contractor Selection and Management Policy.
2. In conjunction with the Contractor evaluation form, the EHS Professional and EHS Rep will be evaluated by BEDC EHS and these shall be included in the evaluations.
3. Any EHS Professional or EHS Rep who knowingly falsifies any data, result, audit, document, etc. will be removed from the Project and precluded from further DEP Work.

1.07 SUBMITTALS

A. Environmental Health and Safety Plan (EHASP)

1. The Contractor shall submit the draft EHASP to the Engineer for review and approval within thirty business days from issuance of the Notice to Proceed. In no case shall Work be allowed to commence without an approved EHASP.
2. Given the project location and scope of work, the EHASP shall include a Worker-in-Water Rescue Plan. The Plan shall include a rescue skiff and lifeline buoys, and if work will occur in winter months, hypothermia/falling into freezing water concerns shall also be addressed. A JHA for performing work over/near water shall also be submitted for review and approval.
3. Initial submission of the EHASP shall be provided as an electronic copy (either Word or Acrobat format) to the Engineer.
4. The EHASP submittal shall be reviewed and comments shall be provided to the Contractor upon completion of the review.
    a. The Contractor shall work with the Engineer to address all comments in order to obtain EHASP approval.
5. Upon receipt of final approval, the Contractor shall provide one electronic copy (either Word or Acrobat format) of the EHASP to the Engineer.
6. The EHASP shall be available to all of the Contractor's employees working on the Contract.
7. Review, acceptance and/or approval of the EHASP will not impose responsibility for the EHASP on any other party, nor will it relieve the Contractor from any of its EHS responsibilities.
8. The Contractor shall adhere to the requirements of BEDC Incident and Near Miss Reporting and Investigation Standard and shall immediately notify the Engineer of all Incidents involving employee injury and illness, and any

other work-related Incidents or Near Misses, damage to equipment and structures, releases or adverse impacts to the environment, or other conditions as defined in the Standard.

9. The Contractor must notify the Engineer and BEDC EHS immediately of any regulatory inspections, notices of citations and penalties, Notices of Violation (NOVs), or any other outside agency violations. In addition, the Contractor shall furnish to the Engineer a copy of all correspondence from OSHA, NYSDEC, the Department of Buildings (DOB) or any other government regulatory agency, within one day of receipt, which may include, but are not limited to, employee complaints, notices of citations and penalties, environmental and NOVs. The Contractor must close out all NOVs and provide documentation to the Engineer that the NOV is closed/corrected as a condition precedent to obtaining final payment.

B. Emergency Action Plan (EAP)

1. Each BEDC project shall have a site-specific EAP in accordance with the BEDC Standard on Emergency Action Plan (EAP) Standard.

C. Contractor EHS Employees

1. The Contractor shall submit to BEDC EHS for approval, the names of the EHS Professional(s) and EHS Rep(s) to be employed. These include the SP, EP, ESP, EHS Rep and ESW as described in section 1.06.

a. BEDC EHS may request and conduct an interview of the candidates prior to approval.

b. The Contractor shall submit the resumes, copies of certifications, a signed certification of employee training, along with other qualifications of the EHS Professionals and EHS Rep. The resumes shall include items such as: experience, education, EHS courses completed, safety and environmental conferences attended, and certifications achieved. Documentation and/or personal references confirming the qualifications may also be required.

c. The DEP may reject persons proposed as EHS Professionals or EHS Reps for failure to have adequate qualifications or for other cause at any point prior to and during the Contract period, as determined by the Engineer.

D. Risk Control Reports

1. The Contractor will forward to the Engineer any risk control reports generated by its insurance carrier or broker within one day of receipt.

E. EHS Professional's Site Visit Report

1. The Contractor will forward to the Engineer any site visit reports generated by the EHS Professional within one day of site visit.

F. EHS Rep's Shift Report

1. The Contractor will forward to the Engineer a copy of the EHASP inspection checklist report forms each day.

G. Monthly Contractor EHS Report

1. The Contractor shall submit, on or before the 7th day of each month, a summary report of EHS activity for the prior month, including, but not limited to:

a. EHS metrics reported on the metrics reporting form provided as part of the pre-construction package and as may be updated throughout the life of the Project.

b. Chemical Inventory with HTSL (Hazardous and Toxic Substance List) and Subpart Z List.

c. Petroleum bulk storage (PBS) inventory and registration certificates (if applicable).

d. Local Law 77 and DEP Bureau of Environmental Compliance air permits.

e. Summary of audit data including trending and analysis along with root cause and corrective actions/training identified.

f. Summary of the regulatory inspections, notices of citations and penalties, NOVs, or any other outside agency violations (which occurred and were provided to BEDC in accordance with this Section).

g. Statements by the SP and EP discussing their review of the monthly report(s) and recommendations for improvement, as necessary.

h. SP/EP Monthly Report shall include the following:

1) Date of the monthly walkthrough inspection

2) Observations including photographs of any deficiencies identified

3) Proposed methods of correction for deficiencies

4) List of corrective actions implemented from the deficiencies noted in the previous month's report

5) Attach monthly PBS inspection (EP), if applicable

6) Report shall be signed by the Contractor's SP/EP

i. Detailed information regarding each pesticide application during the prior month, as specified in Section 01 57 16 - Temporary Pest Control.

2. The Engineer shall review the report to verify that the Contractor is effectively managing the EHS requirements under the Contract. If the Contractor has no, or limited Work in a given month, it shall inform the Engineer that no Work was performed or submit the required documentation for those days that Work was performed.

H. Spill Prevention Program (SPP)

1. At a minimum, the Contractor shall include within the SPP the following:

a. Proper materials handling, labeling and container storage inspection practices for all products including hazardous and universal waste.

b. All petroleum products, hazardous substances, or chemicals must be stored in designated areas and include secondary containment (with capacity to contain 110% of largest container) for all closed containers with a capacity greater than 5 gallons. Open containers of petroleum products, hazardous substances, or chemicals must be stored on secondary containment at all times.

c. Follow manufacturer recommended preventive Maintenance Procedures (MPs) and where none exist, develop in-house equipment specific MPs.

d. Inspection for and purging of residual materials in piping, tanks and other equipment prior to disassembly, demolition and disposal.

e. Supervision of fuel and chemical deliveries. These deliveries shall only be permitted during normal Project work hours or as otherwise approved by the Engineer.

f. The SPP shall include a detailed summary of anticipated petroleum and chemical storage. The information shall include capacity, contents, description and secondary containment provided.

g. If the spill is large and cannot be cleaned up by onsite personnel, provide the name and contact details for the spill cleanup contractor.

h. Include an emergency contact list and hierarchy of contacts in the SPP for spills and incident notification.

i. Provide means and methods for cleaning up anticipated spills.

j. Facilities or construction sites with chemical bulk storage (CBS) tanks or containers registered with the New York State Department of Environmental Conservation (DEC) are required to have a Spill Prevention Report (SPR) as per 6 NYCRR 598(1.9). The SPR must be an attachment of the SPP.

I. Spill Pollution Prevention and Countermeasures (SPCC) Plan

1. If required by EPA 40 CFR 112.1, the Contractor shall prepare a SPCC Plan that details the equipment, workforce, procedures, and steps to prevent, control, and provide adequate countermeasures to a discharge. The Plan must include:

   a. A SPCC Cross-Reference table that includes Provisions, Plan Section, and Page/Appendices

   b. A description of the physical layout and a facility diagram showing the location and contents of each fixed oil storage container and mobile or portable container storage area, transfer stations, and connecting piping;

   c. The type of oil in each fixed container and its storage capacity. For mobile or portable containers, either provide the type of oil and storage capacity for each container or provide an estimate of the potential number of mobile or portable containers, the types of oil, and anticipated storage capacities;

   d. Discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.);

   e. Discharge or drainage controls such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge;

   f. Contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all appropriate Federal, State, and local agencies who must be contacted in case of a discharge.

   g. Description of spills, corrective actions taken and plans to prevent reoccurrence.

   h. A prediction of the direction, rate of flow, and total quantity of oil that could be discharged where experience indicates a potential for equipment failure;

   i. A description of containment and/or diversionary structures (e.g. berms) or equipment to prevent discharged oil from reaching “navigable waters.”

   j. Where appropriate, a demonstration that containment and/or diversionary structures or equipment are not practical;

   k. A complete discussion of the spill prevention and control measures applicable to the facility and/or its operation including procedures for routine handling of the products (loading, unloading and facility transfers);

l. Inspection procedures and records of inspections

m. Security features including fences, locked/guarded gates, locked master flow/drain valves, locked non-operating pumps, capped loading connections and lighting;

Countermeasures for discharge discovery, response and cleanup (both the facility's and those that would be required of a contractor);

n. Methods of disposal of recovered materials in accordance with legal requirements;

o. An emergency contact list, including spill response contractors and all appropriate Federal State, and local agencies who must be contacted in case of a discharge; and

p. A demonstration of the Responsible Individual's approval (signature) and certification by a licensed professional Engineer.

q. If the SPCC Plan calls for additional facilities, procedures, methods, or equipment not yet fully operational, the preparer must discuss these items in separate paragraphs, and must explain separately the details of installation and operational start-up.

2. The Operating Bureau/Responsible Individual is responsible for review of the facility's SPCC Plan at least once every five years. Any amendments to the SPCC Plan must be implemented as soon as possible, but not later than six months following preparation of any amendment. The Contractor is responsible for informing the CM/BEDC of oil quantity changes and updating the SPCC Plan, as necessary.

3. Training requirements. Annual SPCC Training certificates shall be submitted to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. EHS Equipment

1. The Contractor shall provide the proper EHS and rescue equipment for all employees, adequately maintained and readily available, for any foreseeable contingency or situation under the Contract during the performance of the Work.

2. All equipment shall be stored in protected areas and maintained and calibrated in accordance with the manufacturer's recommendations and as specified in the EHASP. Where equipment is required to be inspected and or calibrated, documentation shall be maintained and available for review.

B. Personal Protective Equipment

1. All personnel employed by the Contractor and any visitors entering the job site shall be required to wear appropriate personal protective equipment (PPE) required as specified in the EHASP and the BEDC EHS PPE Standard. The Contractor shall continuously provide and maintain adequate PPE.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. EHS Staff Duties

1. The Contractor's EHS staff (SP, EP, and EHSR) are responsible for overseeing and managing the Contractor's safe and environmentally compliant performance of all Work.

2. EHS Professional(s) shall be required to initiate, review and implement measures to ensure the health and safety of all Contractor employees, and to protect property and the environment. Each EHS Professional is required to visit the Site and audit the Site conditions, at a minimum monthly, in accordance with the Contractor's EHS Plan or as directed by the Engineer.

3. The EHS Professional will be held accountable to adjust his/her workload to enable proper performance of all of their EHS responsibilities in accordance with all requirements of this Section and all applicable regulations. DEP may request that the Contractor remove the EHS Professional for not meeting the Contract requirements.

4. The SP shall visit the Site prior to developing the Contractor's EHASP. The SP will arrange a visit with the Engineer and perform an inspection of the Site to understand the full scope of Work to be performed under the Contract. Contract Documents relevant to writing the EHASP can be reviewed and obtained at this time. Facility/Site specific information must be provided, reviewed, and documented in accordance with the BEDC EHS Site Orientation Standard.

5. The EHS Professionals shall visit all Work areas as frequently as necessary, but no less frequently than monthly, to verify that EHS compliance is being achieved. The EHS Professionals shall review hazards, JHAs, and the foremen's and superintendent's preparation and communication of JHAs to workers. The EHS Professionals shall also review the Project team's compliance with and adherence to EHS requirements, as well as their proactive approach and planning for EHS.

6. The EHS Professionals shall be available for consultation whenever necessary. Prior to and after each visit, the EHS Professional shall sign the visitors' log maintained at the Engineer's office.

7. The EHS Professionals are expected to perform their inspections in concert with the EHS Rep, during which time the EHS Professional will not only inspect the Site, but shall also mentor and direct the EHS Rep. During the inspection, the EHS Professional will evaluate the Contractor and each subcontractor working under the Contract and clearly identify findings and who they are assigned to, using the SP/EP checklist provided in the EHASP. Any findings that cannot be resolved immediately will be assigned to the EHS Rep for follow-up. The EHS Professionals are expected to communicate with the EHS Rep to ensure all identified findings are closed out. The EHS Professionals' inspection shall include programmatic issues such as adhering to the Contractor's EHS program, including, but not limited to, preparing and communicating JHAs and proactively minimizing EHS risks.

8. The EHS Rep will coordinate with the EHS Professionals when questions arise requiring the EHS Professional's expertise. After each visit, the EHS Professional shall prepare a report, including photographs (where necessary), acceptable to the Engineer and BEDC EHS, detailing the findings. The report shall include those hazards and violations discovered during the site visit and when and how they were or will be closed out. Any EHS items not covered or documented by the inspection checklist will be noted in the comments section of the checklist. The report shall be submitted to the Engineer within one business day of the Site visit.

9. The EHS Rep shall be at the job Site full time whenever work is in progress during all shifts.

10. The SP's and EHSR's responsibilities are as follows:

a. The SP is responsible for directing the Contractor's EHS program, ensuring implementation by the Contractor and all Subcontractors, and for directing and monitoring all activities of the EHS Rep. If the EHS Rep is not enforcing the EHASP, JHAs, or other elements of the EHS program, the SP shall either recommend retraining or removal of the EHS Rep from the Project by submitting a letter to the Engineer and the Contractor.

b. The EHS Rep must review JHAs to verify that the Work activity's EHS issues and hazards are accurately identified, addressed, and communicated. JHAs shall be regularly communicated to affected employees and must be made available in the areas where the affected employees are working. The EHS Professionals are responsible for reviewing JHAs at least monthly to verify that they adequately reflect the recognized hazards and controls of the tasks being performed. JHAs shall be provided to the Engineer or BEDC EHS when requested.

c. Both the SP and EHSR shall schedule and conduct EHS meetings and training programs as required. A specific schedule of these meetings and an outline of topics to be covered shall be provided with the EHASP. The Engineer shall be advised in advance of the time and place of such meetings, and DEP personnel shall be invited to attend the meetings.

d. All Contractor employees shall be instructed by the SP and the EHS Rep on the recognition of hazards, safe Work practices and environmental precautions, the contents of the EHASP, and the use of environmental, personal protective and emergency equipment. Such training shall be documented, recorded, and provided as part of the EHS monthly report(s). EHSRs and EHS Professionals will attend regularly scheduled meetings held by the Engineer and BEDC EHS including, but not limited to, the EHS Pre-Construction Meeting.

e. Determine that operators of specific equipment are qualified by training, certification and/or experience before they are allowed to operate such equipment. Ensure documentation of licenses, certifications and training by the appropriate agencies (for example OSHA, NYC DOB, NYC Fire Department, etc.) are on site and current, prior to start of Work.

f. Verify implementation of the BEDC Emergency Action Plan (EAP) Standard.

g. Develop an effective Site communication plan that includes, signage, and verbal and written communication of EHS issues and notices.

h. Post all appropriate notices regarding EHS regulations at Site location(s) which afford maximum exposure to all personnel at the job Site.

i. Post appropriate instructions and warning signs regarding all hazardous areas or conditions which cannot be eliminated. Identification of these areas shall be based on experience, site surveillance, and severity of hazard. Such signs shall not be used in place of appropriate workplace controls.

j. The EHS Rep shall conduct EHS inspections a minimum of twice per shift to ensure that all machines, tools and equipment are in a safe operating condition, and that all Work areas are free of safety and environmental hazards. The EHS Rep shall take necessary and immediate corrective actions, where feasible, to eliminate all unsafe acts and/or conditions, and submit to the Engineer each day a copy of the findings on the inspection check list report forms established in the EHASP. Detailed checklists shall be tailored to the EHS hazards and conditions on the Site, and shall include a comments section to include findings not specifically listed on the checklist.

k. Whenever DEP and its agents perform both announced and unannounced inspections of the Contractor's EHS performance, a member of the Contractor's on-site EHS team shall be available during the inspections. The SP will coordinate inspections with the Engineer and DEP inspectors upon request. The Contractor shall take immediate corrective action, where feasible, to eliminate hazards identified by the Engineer, DEP inspectors, or any other entity. The Contractor, if requested, shall develop and implement a plan detailing corrective actions necessary to mitigate the presence of noncompliant conditions and actions following Incidents, citations, NOVs, or identification of patterns of noncompliant conditions and acts.

l. Notify the Engineer and BEDC EHS immediately of all inspections by regulatory agencies, and submit to the Engineer and BEDC EHS copies of all EHS reports, citations, and NOVs from regulatory agencies and insurance companies within one workday of receipt.

m. Implement an effective fire protection and prevention program at the Site throughout all phases of the construction Work in accordance with BEDC's Fire Prevention Standard. The Contractor will ensure the availability of fire protection and suppression equipment adequate to control the degree of fire hazard encountered during construction.

n. Provide and document appropriate Site-specific orientation to Contractor employees, visitors, and Subcontractors communicating

recognized hazards present at and surrounding the Site(s) and facility in accordance with BEDC's Site Orientation Standard and DEP's Contractor Selection and Management Policy.

o. Perform all tasks and responsibilities as identified in the EHASP.

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. EPCRA and Related Hazardous Material Regulations

1. The Contractor shall maintain a monthly inventory of hazardous substances or extremely hazardous substances used or stored on Site in accordance with the BEDC-provided chemical inventory form. Documentation shall be maintained on Site and available for review.

2. The Contractor shall prepare and provide to the Engineer a Right to Know (RTK)/Emergency Planning and Community Right to Know Act (EPCRA) Annual Chemical Inventory Form for all hazardous and extremely hazardous substances that the Contractor used or stored during the previous calendar year. This shall be provided by January 15th of each year.

3. In addition to any requirements of the New York City Standard Construction Contract, in order to obtain Final Acceptance, the Contractor must satisfy all EPCRA reporting requirements for the final year of the Contract.

B. Temporary Protective Grounding Equipment

1. Temporary Protective Grounding Equipment (TPGE) shall be used at locations required by 29 CFR 1910.269. TPGE may be used at other locations, when specified in the EHASP.

2. TPGE shall not be used as a substitute for following lockout procedures.

C. Hot Work

1. The performance of Hot Work is prohibited unless performed under the issuance of a Hot Work permit from the Permit Authorizing Individual (PAI). The PAI shall be provided by the DEP.

a. Where the DEP and Engineer are not routinely present, the Contractor may be allowed to obtain PAI certification for Contract employees.

2. The Contractor shall provide the Engineer with a JHA at least 48 hours prior to the performance of Hot Work. The JHA shall identify the following:

a. The locations where the Work is to performed;

b. Equipment to be used;

c. Gases or vapors within or adjacent to the location that have the potential to create a combustible atmosphere;

d. Controls required to mitigate or prevent the accumulation of gases or vapors in quantities that have the potential to create a combustible atmosphere; and

e. Controls or methods to promptly discontinue the use of and de-energize equipment when a combustible atmosphere is detected.

3. For Hot Work in hazardous (classified) locations, refer to the requirements of Section 01 35 44 – Working in Hazardous (Classified) Locations.

D. Electrical Equipment Lockout

1. Contractor is required to lock out all electrical equipment utilizing lockable disconnecting means that provide mechanical isolation followed by verification of no voltage, as according to OHSA 1910/1926 and NFPA 70E; equipment tag out is not sufficient. If a lockable disconnecting means is not available at the identified equipment due to equipment design or operational condition, the Lockout process will continue elevating to the next level of the system, electrical or otherwise, until a lockable disconnecting means is available providing mechanical isolation. Complex electrical systems and network power distribution systems require lockable disconnecting means at all isolation points from the main power source through the downstream equipment loads (e.g. systems with A and B bus sources or other multiple power sources). The lock out requirement will be performed to the greatest extent possible in consideration of plant operational impacts. When the plant operational impacts are too significant to environmental compliance, an alternative method may be utilized know as an Energized Electrical Work Permit (EEWP). An EEWP is a document, defined by NFPA 70E, that clearly describes the following: the circuit, equipment, and location of the job/task at hand; the work that is to be done; justification of why the circuit or equipment cannot be de-energized or the work deferred until the next scheduled outage; performed by an Electrical Safety Worker (ESW); signatory authorization by the Plant Chief or Facility Manager.

3.04 STARTUP / DEMONSTRATION

A. Visitors

1. Allowing visitors and members of the public to tour an active construction site is discouraged due to the potential exposures to hazardous conditions and materials associated with construction Work. However, where necessary, approved and authorized visitors of the Contractor, Subcontractors, or any other authorized agency, department, or other entity associated with the Contractor shall sign in at both the DEP/Contractor Security Booth and the Visitors' Log maintained at the Contractor's Site

office. Visitors are required to receive Site orientation training, comply with all provisions of the EHASP, wear proper and appropriate PPE and be escorted at all times. All efforts should be made not to schedule site tours/visits at the time of the scheduled evacuation drills. Visitors must not be exposed to construction hazards without prior training with respect to those construction hazards.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT A

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

REV 4, 6/23/2022

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

1. Scope

The goal of the New York City Department of Environmental Protection (DEP) is to run the safest operations and capital program in the country with the best environmental compliance record of any large water and wastewater utility. To achieve that goal, DEP strives to hire safe and environmentally compliant contractors and to systematically manage, monitor and evaluate contractors that are working on DEP projects and at DEP locations.

As such, DEP has developed procedures to ensure that contractors' environmental, health and safety (EHS) records and programs are evaluated when DEP is selecting a contractor or approving a subcontractor. These procedures require that all contractors are properly prepared and trained to safely complete the work and to adhere to all EHS laws, rules, and applicable standards as contractually required. DEP work sites are subject to requirements regarding qualification, supervision, and activities of contractors.

These contract requirements (Specifications) set forth the EHS eligibility standards for contract award as well as the applicable EHS training requirements and requirements specific to working on a DEP project. The Contractor must comply with applicable federal, state, and local codes and standards, including environmental and occupational safety and health requirements, as well as any additional special requirements invoked by other sections of the Contract.

Unless otherwise specified, these Specifications do not apply to:

- Contractors providing services with little likelihood of affecting DEP employee safety, DEP property, the public, and the environment, such as consulting services, light janitorial work, laundry, delivery (e.g., food and drink, furniture, filing cabinets), other supply services and shipping, or other products/services as determined by the contracting Bureau.
- Entities funded by DEP which do not directly provide labor or services to DEP, but which utilize funds to independently contract with others to provide services. Examples include other governmental agencies, grant recipients, and non-profit groups. Bureaus may require such entities to comply with the requirements of this policy by specifically adding these criteria into an agreement or contract;
- Other products or services, as determined by the contracting Bureau that do not have the potential to impact safety, public health or the environment.

2. Pre-Award

2.1 Contractor Safety Record Submittals

Within 5 business days of DEP request, the apparent low bidder shall provide the information specified below. Failure to provide the required information may result in a rejection of the bid.

2.1.1 NY Intrastate Experience Modification Rating (EMR) for past 3 years.

Bidder shall provide its NY Intrastate EMR for the past 3 years on its insurance broker's letterhead. EMR information provided by the New York State Insurance Rating Board is also acceptable. If the bidder does not have a NY Intrastate EMR, its out-of-state EMRs shall be submitted. DEP may also request a company's Workers Compensation Loss Runs to verify EMR.

Bidders that do not have an EMR shall provide, for the past 3 years, their: (a) Workers Compensation Loss Runs (this information shall be provided by their insurance broker); (b) OSHA Total Recordable Cases (TRC); and (c) Days Away, Restricted, or Transferred (DART) rates.

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

Bidders are expected to have an EMR of 1.0 or below. If a bidder's EMR is greater than 1.0 in any single year within the 3-year period, the bidder shall submit the following:

- An explanation and supporting documentation explaining why the EMR is greater than 1.0 and detailed steps that have been taken to improve the bidder's EHS performance.
- Five years of Workers Compensation Loss Runs (this information shall be provided by the insurance broker) and documentation of payroll during that same period.
- For each indicated loss, the bidder shall provide a summary of the loss facts and investigation, including a summary of corrective actions undertaken and modifications or development of EHS programs.
- If the bidder has been notified by the New York Compensation Insurance Rating Board (NYCIRB) within the past 3 years that they must participate in the Industrial Code Rule 59, Workplace Safety and Loss Prevention, program then the bidder shall provide a copy of their Consultation Report from a Certified Consultant, documentation of the implementation of the Report identified

corrective action(s) and recommendation(s), and a copy of the carrier required re-inspection. If the bidder elected to instead receive a worker's compensation premium surcharge, they shall so indicate.

2.1.2 Last 3 years of OSHA 300 Forms (Logs of Work-Related Injuries and Illnesses) and/or 300A redacted summary worksheets (as available, to verify accuracy of information provided).

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

If a bidder's EMR is greater than 1.0, the bidder shall submit their OSHA 300A redacted forms for the entire period covered by the work loss runs indicated in Section 2.1.1 above.

2.1.3 List of all federal, state and local regulatory agency (e.g., OSHA, NYSDEC, USEPA, USDOT, DEP, FDNY and NYCDOB, etc.) notices of violation, notices of deficiencies, and fines issued/received in the past 3 years; the letter listing these (or stating that no notices of violation, notices of deficiencies, and no fines have been issued/received in the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.4 List of reportable releases of chemical or petroleum products associated with the bidder's operations during, at a minimum, the last 3 years; the letter listing these (or stating that no reportable releases associated with the bidder's operations have occurred during the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.5 A written description of the bidder's EHS programs (and associated training), including any EHS programs and procedures employees will be required to follow while providing labor or services for DEP. Upon request by DEP, the bidder shall also provide a protocol for the EHS evaluation of any subcontractors that could be proposed by it for DEP approval.

2.1.6 A sworn, notarized certification from a principal or officer that, if the bidder is awarded the Contract, its EHS programs shall meet all OSHA, USEPA, NYS and local regulations, and the bidder shall abide by applicable DEP policies and procedures, as appropriate, and as provided by DEP. (Refer to Bidder's EHS Performance and Program Review Questionnaire/Checklist that is included with the bid submission materials in the Invitation for Bids package).

2.1.7 For bidders that are joint ventures, the above information must be provided and will be reviewed for the joint venture itself and the individual joint venture partners.

2.2 Responsiveness

The items submitted under 2.1 will be evaluated as the contractor's safety record. Further, the bidder's EHS submittals and training program descriptions must indicate that the bidder:

- understands its regulatory requirements
- has a proactive and acceptable EHS and training program in place
- has performed acceptably on prior DEP projects as applicable.
- has adequate EHS professionals available for the project
- has demonstrated an acceptable safety record for the time periods reviewed.
- has demonstrated an acceptable safety record on similar projects over the past three years; and
- has certified that its program and training comply with all regulatory requirements.

3. Proposed Subcontractors

3.1 The subcontractor approval process requires an information submittal that includes the proposed subcontractor's EMR, EHS program descriptions and certifications like those in sections 2.1 and 2.2.

3.2 The standards listed in Section 2.2, above, shall also apply to the approval of proposed subcontractors that would be performing a significant volume or aspect of the project.

4. Contractor Orientation

4.1 Prior to commencing any work at any DEP location, the Contractor shall be required to attend an orientation. After attending the initial orientation, the Contractor shall, in turn, provide an orientation to any of the Contractor's employees assigned to work at the DEP location. This training must also be provided to subcontractors, suppliers[1], and Contractor visitors who will be onsite.

4.2 During orientation, DEP will provide the Contractor with the most current:

4.2.1 Work site-specific hazardous conditions and related information (e.g., hazardous chemicals present at the work site, locations of Safety Data Sheets, and required safe work practices including minimum Personal Protective Equipment (PPE) requirements);

4.2.2 Facility-specific lockout/tagout requirements;

[1] This requirement does not apply to suppliers providing services or products that are determined by the Bureau administering the Contract to have little likelihood of affecting DEP employee safety, property, the public, or the environment.

4.2.3 Applicable sections of the work site's Emergency Action Plan and, at a minimum, the emergency contact numbers, facility map, notification procedures, evacuation procedures, evacuation routes, assembly areas, and description of alarms;

4.2.4 Access control procedure;

4.2.5 Location of restricted areas accessible from the work area or approaches to the work area (e.g., Process Safety Management/Risk Management Plan-covered processes, permit-required confined spaces, and other high-hazard areas) and procedures for working in and around restricted areas;

4.2.6 DEP's Workplace Violence Prevention Policy;

4.2.7 DEP's Possession of Firearms in the Workplace Policy;

4.2.8 All other applicable DEP policies and procedures that will, or may, be necessary for the work; and

4.2.9 Information on known constituents of concern in the work area, including areas known to contain, or having historically contained, lead, asbestos, PCBs, and mercury.

4.3 If provided one by DEP, the Contractor shall distribute to all workers who are to attend the orientation a hazardous material and safe work practices information package. If possible, it will be distributed at least two days prior to the orientation. The workers shall sign for the packages and indicate that they have reviewed the contents prior to their attending the orientation.

4.4 Prior to commencing any work, a responsible official of the Contractor shall certify that it understands its obligations to train its employees and that it has been informed of and will abide by applicable DEP policies and procedures while it is working at DEP work sites.

4.5 If the Contractor or a subcontractor needs to add additional or replacement worker(s) to its crews, the new worker(s) must be provided with the same information received by other workers and receive the orientation for the work site(s).

4.6 The Contractor shall use the Contractor Training Certification form provided by DEP (or an equivalent form), as the record of those Contractor and subcontractor employees who have completed the facility orientation.

5. Requirements During Work

5.1 When and where required by the DEP Bureau of Police and Security, the Contractor, and its subcontractors, and all their respective employees shall, always when working at the site(s), wear photo-identification badges.

5.2 The Contractor shall develop a work plan that identifies and addresses safety hazards and environmental requirements prior to starting any work.

5.3 PPE must be utilized in accordance with the work plan.

5.4 The Contractor and its subcontractors and all their respective employees shall, upon request, produce certificates, licenses, and other documentation that laws or regulations require them to obtain them to conduct activities they are performing (e.g., Asbestos Worker Certificate, FDNY Certificate of Fitness in New York City).

5.5 The Contractor's and its subcontractors' employees are restricted from entering all high-hazard process areas unless access is required to perform their work. In coordination with the Contract Supervisor, the Contractor or subcontractor employees entering such process areas must obtain permission from the on-duty operator or supervisor in person or by the telephone before entering these areas. Further, Contractor or subcontractor employees must inform the on-duty operator or supervisor in person or by telephone upon leaving and follow all other facility access control procedures.

5.6 Any worker who fails to abide by the EHS requirements presented in the safety orientation shall, at the sole discretion of the DEP, be denied access to the facilities and shall be replaced by the Contractor, as directed by DEP.

5.7 The Contractor shall immediately inform the DEP Contract Supervisor and the facility's most senior manager of all incidents and all near misses; and of any notices of violation (NOVs), notices of deficiencies (NODs), and fines issued by and/or received from regulatory agencies resulting from work performed. Initial written reports shall be submitted by the next day. Note that other specification sections in this Contract may include additional investigation and reporting requirements and must be consulted. The more stringent requirements will apply in the event of any conflict.

5.7.1 The Contractor must close out all NOVs, and all other violations/deficiencies, and pay the appropriate fines before final or subsequent payments can be made by DEP. The Contractor will not receive final payment if there are open violations or notices of non-compliance.

6. Evaluations of Contractor EHS Performance

6.1 DEP will perform evaluations of the Contractor's performance to ensure compliance with all EHS laws and regulations and DEP and facility EHS requirements. Such

evaluations will be considered when evaluating the Contractor's bids for future contracts.

6.2 The Contractor shall be rated on each category shown on the Contractor EHS Evaluation form a copy of which should be provided to the Contractor by the Contract Supervisor. ("NA" is acceptable where the requirement was not applicable). The Contract Supervisor may include other specific EHS categories under "Other" that are of particular importance to the project. The Contract Supervisor shall inform the Contractor prior to commencement of work when this is the case.

6.3 DEP considers compliance with and conformance to EHS requirements to be of the utmost importance, and recognizes that, on particular projects, the importance of compliance with certain requirements may carry more weight than others, as failure to comply may present a greater level of risk. The final rating for the job in such a case may be weighted more heavily on specific categories (one or two) if compliance with that/those program requirement(s) is paramount to worker safety and/or environmental protection. In this case, the Contractor shall be notified prior to the commencement of work or through the development of risk-based safety plans during the project.

6.4 The following rating scale shall be utilized in conducting the Contractor evaluations:

Excellent – Contractor exceeded EHS contractual, policy, and/or regulatory requirements. Work was accomplished with no observed deficiencies and no violations. Contractor proactively and effectively addressed potential risks. Contractor demonstrated EHS leadership and best practices and showed alignment with DEP's EHS goals.

Good – Contractor met or exceeded most EHS contractual, policy, and/or regulatory requirements. Work was accomplished with limited or minor observed deficiencies or minor violations. Correction and preventative actions taken by the Contractor were timely and effective.

Fair – Contractor met EHS contractual, policy, and/or regulatory requirements. Observed deficiencies or violations were satisfactorily corrected and did not indicate a pattern of repetition. The correction and preventative actions taken by the Contractor were completed in a timely manner.

Poor – Contractor did not meet some EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but the Contractor either did not identify corrective and preventative actions or proposed correction and preventative actions that appeared to be only marginally effective.

Unsatisfactory – Contractor did not meet a significant number of EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but Contractor did not develop a Corrective and Preventative Action Plan, or failed to implement a Corrective and Preventative Action Plan, or implemented an unsuccessful Corrective and Preventative Action Plan. Deficiencies and/or violations indicated a pattern of repetition.

6.5 A Contractor that disagrees with an overall evaluation of "Poor" or "Unsatisfactory" can submit a written request for reconsideration to the DEP Contract Supervisor within 10 business days after receipt of the written evaluation. The request for reconsideration must set forth all the relevant information and arguments and be accompanied by any documentation relied on in support of the request. The request for reconsideration will be reviewed by the Deputy Commissioner overseeing the Bureau or his or her designee. The Deputy Commissioner or designee will notify the Contractor of the determination of the request in writing. Such determination will be final.

6.6 If its evaluation (other than the final evaluation) is "Poor" or "Unsatisfactory," the Contractor must prepare a Corrective and Preventive Action Plan to correct and prevent recurrence of the deficiencies identified through the evaluation.

* * * * * *

EXHIBIT B

BIDDER'S EHS SAFETY RECORD AND PROGRAM REVIEW QUESTIONNAIRE

REV 4, 6/23/2022

DEP Contract Name or Number:		
Contractor Name:		
Location(s) and description of work to be performed (attach work summary from contract):		
Provide as part of the pre-award submittal:	☐	EMR Rating (1.0 or below)[1]
	☐	OSHA 300 logs and/or 300A redacted worksheets
	☐	Sworn, certified and notarized letter with information on all regulatory violations and reportable releases in the past 3 years
	☐	Sworn, certified and notarized letter from principal that if awarded the contract, its EHS programs shall meet all OSHA, US EPA, NYS and local regulations and shall abide by all DEP policies and procedures (with information on all reportable releases in the past 3 years
	☐	Written description of firm's EHS and training programs
Attach Table of Contents of Firm's EHS programs and describe below		
Describe employee EHS training below, including new employee training (or attach)		
Describe protocol for subcontractor approval and onboarding below (or attach)		

[1] Contractors with EMRs over 1.0 must provide the documents references in sections 2.1.1 of the DEP Contractor Selection and Management Policy Attachment A (Rev. 4).

Certifications
I certify that the EHS and Training Programs for:

(Company Name)_____

comply with applicable OSHA, USEPA, NYSDEC and NYC regulatory requirements and that the information presented on this form and attachments is accurate and complete. Our company is aware and understands its obligations under the OSHA, USEPA, state and NYC standards (if applicable).

Signature: _____ Title: _____

Print Name: _____ Date: _____

SECTION 01 35 44 – WORKING IN HAZARDOUS (CLASSIFIED) LOCATIONS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Hazardous (Classified) Locations

B. Combustible Gas Detection

C. Qualifications of Combustible Gas Detection Employees

D. Task Hazard Analysis

E. Hot Work Permit

F. Air Monitoring Notices and Reports

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	7
1.07	Submittals	8
1.08	Delivery, Storage, and Handling	9
1.09	Spare Parts, Special Tools, and Supplies	9
1.10	Warranty	9
PART 2	PRODUCTS	9
2.01	Manufacturers	9
2.02	Materials / Equipment	9
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	9
PART 3	EXECUTION	9
3.01	Examination / Preparation	9
3.02	Installation	9
3.03	Field Testing / Quality Control	9
3.04	Startup / Demonstration	9
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental, Health and Safety Requirements

1.04 REFERENCES

A. Combustible Gas Detection: Performed by use of a gas detector to detect the presence of flammable vapors and gases and to warn when concentrations in air approach the explosive range.

B. Hazardous (Classified) Locations: A location that is classified based on the properties of the flammable vapors, liquids, or gases, or combustible dusts or fibers, that might be present and the likelihood that a flammable or combustible concentration or quantity that is present.

C. Hot Work: Any work involving burning, welding, grinding, or similar operations that are capable of initiating fires or explosions.

D. Rated Equipment and Wiring:

1. Explosion Proof: Equipment and wiring that is enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

2. Intrinsically Safe: Equipment and wiring that are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture.

3. Approved Industrial Truck: A truck that is listed or approved by a nationally recognized testing laboratory for fire safety purposes for the intended use and designated for the Hazardous (Classified) Location in accordance with the OSHA regulation at 29 CFR 1910.178(b).

E. Lower Explosive Limit (LEL): The concentration of a combustible material in air below which ignition will not occur.

F. Upper Explosive Limit (UEL): The highest concentration of a combustible substance in a gaseous oxidizer that will propagate a flame.

G. Public Announcement (PA): A statement of message communicated to a broad audience.

1.05 DESCRIPTION

A. Hazardous (Classified) Locations

1. The Contractor's attention is directed to the fact that certain Work areas where process equipment, tanks or piping systems exist above or below the ground may be configured such that they may be classified to be Hazardous (Classified) Locations as defined in this Section.

a. All areas are Unclassified.

2. The Contractor shall be aware of the classification of all work areas and understand that the introduction of certain equipment and materials may cause an area to be re-classified as a Hazardous (Classified) Location.

3. The Contractor shall prevent unauthorized work from taking place in any Hazardous (Classified) Location:

   a. Before entering any Hazardous (Classified) Location, the Contractor shall ensure that a safe working atmosphere exists;

   b. When working within the Hazardous (Classified) Locations, the Contractor shall take suitable precautions to ensure a safe working atmosphere;

   c. The Contractor shall take all necessary protective measures to ensure the safe completion of the Work.

4. Atmospheric monitoring to ensure the protection of employee health and safety must comply with the requirements of the Contractor's Environmental Health and Safety Plan (EHASP) as per Section 01 35 27 – Environmental Health and Safety Requirements.

B. Working in Hazardous (Classified) Locations:

1. All Hazardous (Classified) Locations and the extent of such locations shall be identified prior to the performance of Work in Hazardous (Classified) Locations.

2. Work in Hazardous (Classified) Locations shall be performed using only equipment and wiring rated and clearly marked for such use, unless approved Combustible Gas Detection equipment and qualified Combustible Gas Detection personnel are provided to ensure a safe working atmosphere for the duration of the time that employees are working in Hazardous (Classified) Locations.

3. The performance of Hot Work in Hazardous (Classified) Locations is prohibited unless performed under the issuance of a DEP Hot Work permit from the Permit Authorizing Individual (PAI). The Engineer and/or DEP shall provide the PAI.

   a. Where the Engineer and DEP are not routinely present on site, the DEP may authorize the Contractor to obtain PAI certification for a Contractor employee in order to issue hot work permits.

   b. In active DEP facilities, the Hot Work permit will also be signed off by the DEP Operating Bureau Designee (OPD).

4. The Contractor shall provide the Engineer with a Job Hazard Analysis (JHA) at least 48 hours prior to the performance of Hot Work in a Hazardous (Classified) Location. The JHA shall identify the following:

   a. The Hazardous (Classified) Locations where the Work is to be performed;

b. Equipment and wiring to be used in the Hazardous (Classified) Location;

c. Gases or vapors within or adjacent to the Hazardous (Classified) Location that have the potential to create a combustible atmosphere;

d. Controls required to mitigate or prevent the accumulation of gases or vapors in quantities that have the potential to create a combustible atmosphere;

e. Controls or methods to promptly discontinue the use of and de-energize non-rated equipment when a combustible atmosphere is detected.

5. The Contractor shall not use any non-rated equipment (e.g., powered industrial trucks not specifically rated for the areas to be used) in Hazardous (Classified) Locations without obtaining approval from the Engineer.

a. Where approval is provided the Contractor shall provide the Engineer with documentation that workers using non-rated equipment in the Hazardous (Classified) Location have been provided training and information on the applicable JHA and emergency procedures prior to working with non-rated equipment.

C. Combustible Gas Detection:

1. The Contractor shall arrange for Combustible Gas Detection to be performed by qualified Combustible Gas Detection personnel, as identified within this Section, anytime Work is to be performed in Hazardous (Classified) Locations with equipment and wiring that is not rated for such use. The Contractor shall certify that all Work in Hazardous (Classified) Locations is being performed in a safe atmosphere.

2. Prior to commencing the Work for Combustible Gas Detection, the Contractor shall submit for the approval of the Engineer a communications protocol detailing the type and sequence of warning signals to be utilized, and describing the evacuation procedure to be employed, whenever a hazardous condition occurs .

3. The Contractor shall ensure that Combustible Gas Detection equipment, which is listed by Underwriters Laboratories (UL) and rated for use in Hazardous (Classified) Locations, is calibrated, tested and maintained prior to use in a Hazardous (Classified) Location by qualified persons in accordance with the requirements of the equipment's manufacturer.

4. Prior to the start of Combustible Gas Detection, the Contractor shall:

a. Ensure the gas detection manager has performed an analysis of the work area to evaluate the combustible gas hazards of the location, determine the arrangement of Combustible Gas Detection

equipment and implement any further controls necessary to mitigate or prevent the accumulation of a combustible atmosphere (i.e., ventilation controls, equipment positioning, etc.).

b. Calibrate all Combustible Gas Detection equipment in accordance with the manufacturer's requirements, and perform any necessary test functions (e.g., "bump test") at a minimum daily to ensure appropriate use of the equipment in accordance with the manufacturer's requirements.

c. Where the use of non-rated equipment is approved as described within this Section, Position Combustible Gas Detection equipment to establish monitoring results at least 15 minutes prior to the use of any non-rated equipment in a Hazardous (Classified) Location. The following conditions must be present to allow for the initial use of non-rated equipment:

1) An oxygen level greater than 19.5 percent and less than 23.5 percent concentration;

2) A LEL less than 5 percent concentration.

d. Ensure the JHA for performing Hot Work in a Hazardous (Classified) Location is prepared, reviewed and updated by the Contractor's gas detection manager prior to the start of Hot Work and any time:

1) The scope of Work changes to introduce hazards or a potential for combustible gases or vapors to be present was not previously identified;

2) The JHA's hazard evaluation does not adequately address the identified hazards;

3) Hazard controls of the JHA have changed or do not sufficiently mitigate or prevent the accumulation of a combustible atmosphere.

e. Provide written verification to the Engineer that all gas detection equipment has been properly calibrated and tested prior to the start of Work in any Hazardous (Classified) Location.

f. Provide written verification to the Engineer that all work areas where non-rated equipment and wiring being used is safe through the issuance of a Notice of Safe Atmosphere upon calibration and testing of gas detection equipment and prior to the use of non-rated equipment in a Hazardous (Classified) Location.

5. Continuously monitor the Hazardous (Classified) Location with documented readings every 15 minutes. Electronic data logging where gas detection equipment possesses such capabilities is adequate so long as

readings are recorded at least every 15 minutes and results are capable of being provided to the Engineer as written documentation.

6. Combustible Gas Detection equipment shall be capable of providing a continuous digital output measuring:
   a. Oxygen in percent concentration;
   b. LEL in percent concentration.
7. A warning condition shall be declared to all affected persons in the area, and the Engineer, by radio, PA, or in person anytime the following condition exists:
   a. LEL greater than 5 percent.
8. Work shall be immediately stopped and non-rated equipment de-energized when any hazardous atmosphere is measured by gas detection equipment. A hazardous atmosphere is determined by the presence of any of the following:
   a. Oxygen levels less than 19.5 percent or greater than 23.5 percent concentration;
   b. LEL greater than 10 percent.
9. When a hazardous atmosphere is present, a hazardous condition shall be declared and the gas detection technicians shall immediately implement the following actions:
   a. Sound a portable air horn to warn all personnel that a hazardous atmosphere exists;
   b. Notify the Contractor and the Engineer by radio communication, PA, or in person that a hazardous condition has been declared;
   c. Notify all persons in the potentially affected areas to immediately evacuate the area and discontinue use of non-rated equipment in Hazardous (Classified) Locations until the Engineer determines the conditions leading to the presence of a hazardous atmosphere, identified corrective actions to mitigate or prevent a re-accumulation of an unsafe atmosphere, and the atmosphere of the Hazardous (Classified) Location has returned to levels that personnel can safely resume operations in the area;
   d. Issue a Notice of Unsafe Atmosphere to the Engineer and ensure access is precluded by the Contractor’s personnel in areas where a hazardous atmosphere is present;
   e. The Contractor shall make combustible gas detection equipment available to the Engineer during the investigation and corrective/preventative action review.

10. When the Contractor determines that a hazardous atmosphere no longer exists, Work may resume upon issuance of a Notice of Safe Atmosphere in accordance with the procedures identified in this Section.

11. Provide all required Combustible Gas Detection equipment in sufficient quantities, with backups.

    a. The number of required equipment shall be determined by the gas detection manager and shall consider the size of work area, work to be performed, location of personnel, and configuration. Gas detection shall be adequate to identify potentially hazardous conditions in any area which could present a hazard to personnel.

1.06 QUALITY ASSURANCE

A. Qualification of Combustible Gas Detection Employees:

1. The Contractor shall ensure the following qualified personnel are available when performing Combustible Gas Detection:

    a. A gas detection manager who meets at least one (1) of the following and has been approved by DEP:

        1) Certified Industrial Hygienist (CIH) by the American Board of Industrial Hygienists (ABIH) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

        2) Certified Safety Professional (CSP) by the Board of Certified Safety Professionals (BCSP) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

        3) Bachelor of Science degree in industrial hygiene, occupational safety and health, or environmental health and science and ten (10) years of documented professional industrial hygiene and air monitoring management experience.

    b. Gas detection technicians shall be present as necessary to ensure the continuous monitoring for the presence of combustible gases and shall have no other responsibilities than those of a combustible gas detection technician. Technicians shall meet the following prior to operating Combustible Gas Detection equipment:

        1) Trained in the calibration, testing, maintenance and operation of the Combustible Gas Detection equipment being used;

        2) Have a minimum of six (6) months' experience in the monitoring of combustible gases and vapors;

3) Where confined spaces are involved, possess confined space training to include the responsibilities of the confined space entrant, attendant and entry supervisor.

c. The Engineer shall have the right to interview and review the qualifications of all personnel performing Combustible Gas Detection.

1.07 SUBMITTALS

A. At a minimum, submittals shall include:

1. Prior to the commencement of any Work of this Section, the following items shall be submitted to the Engineer:

a. Qualifications of the Combustible Gas Detection employees.

2. In addition, during the performance of Work, the Contractor shall submit the following items as required in this Section:

a. JHA;

b. Communications protocol;

c. Written verification of equipment calibration;

d. Written review and verification of conditions;

B. Air Monitoring Notices and Reports

1. The Contractor shall prepare and submit the following air monitoring notices and reports to the Engineer:

a. Notice of Safe Atmosphere:

1) When a previously determined hazardous atmosphere has been eliminated, and immediately after completing the procedures required above, the Contractor shall prepare and deliver a Notice of Safe Atmosphere to the Engineer;

2) If the Notice of Safe Atmosphere is issued to rescind a Notice of Unsafe Atmosphere, it shall identify the contributing factors leading to the unsafe atmosphere and the necessary corrective actions to prevent reoccurrence.

b. Notice of Unsafe Atmosphere:

1) This notice shall be prepared on site when a hazardous condition is detected and immediately after all notifications required above within this Section have been completed. The Notice of Unsafe Atmosphere shall specify the type(s) and concentration(s) of gas(es) detected, the nature of the gas hazard and the location where, and the time when the hazard has been detected;

2) This notice shall be presented to the Engineer immediately upon completion.

C. Daily Log Report

1. The daily log report shall be provided to the Engineer daily and provide the Combustible Gas Detection equipment's readings in 15 minute intervals. Location and other task specific information shall be included in the daily report.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 35 45 – HAZARDOUS MATERIALS CONTROL
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Known Hazardous Materials
2. Unforeseen Hazardous Materials
3. Hazardous Materials Investigation and Remediation
4. Hazardous Waste Management and Regulatory Compliance

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	7
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	8
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 27 00 – Measurement and Payment

B. Section 01 35 27 – Environmental, Health and Safety Requirements

C. Section 01 41 00 - Regulatory Requirements

D. Section 02 24 20 - Soil Sampling and Analysis

E. Section 02 82 05 – Asbestos Management

F. Section 02 84 10 – Mercury Management

G. Section 02 83 05 – Lead Management

H. Section 02 84 05 – PCB Management

1.04 REFERENCES

A. Definitions

1. Competent Person: One who is capable of identifying existing and predictable hazards in the work area or unsanitary, hazardous, or dangerous working conditions, and who has authority to take prompt corrective measures (29 CFR 1926.32(f)).

2. Large Quantity Generator (LQG): A facility that generates (in a calendar month) ≥1,000 kg of total hazardous waste or >1 kg of acute hazardous waste or >100 kg of acute hazardous waste spill residue or soil, or at any time stores hazardous and acute hazardous wastes in greater quantities (at any time) than 6,000 kg of hazardous waste, 1 kg acute hazardous waste, or 100 kg of acute hazardous waste spill residue or soil.

1.05 DESCRIPTION

A. Known Hazardous Materials

1. No hazardous materials are known to exist at the site. Contractor shall do a visual inventory, and if any materials are considered suspect, a hazardous materials sampling investigation shall be performed under this section. As applicable to its Work, the Contractor shall incorporate these minimum requirements into its Environmental, Health and Safety Plan (EHASP) or other applicable submittal to ensure a safe and healthful working environment. The EHASP shall be designed in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

a. Upon completion of any additional material sampling at the Work Site(s), the Contractor's EHASP shall be updated as needed to incorporate new data generated by analysis of the samples.

2. The Contractor shall not initiate or proceed with any Work in areas associated with the contaminated, potentially hazardous, or hazardous materials until these materials have been removed from these areas or managed in accordance with the DEP Hazardous Waste Management Policy and the following Specifications:

a. Asbestos-containing material shall be handled in accordance with Section 02 82 05 – Asbestos Management.

b. Mercury-containing equipment and material shall be handled in accordance with Section 02 84 10 – Mercury Management.

c. Lead-containing paint shall be handled in accordance with Section 02 83 05 – Lead Management.

d. PCB-containing material shall be handled in accordance with Section 02 84 05 – PCB Management.

e. If not handled under the above Sections, universal waste and other regulated wastes shall be handled in accordance with Section 01 74 20 – Construction Waste Management.

3. The Contractor shall attend an initial site inspection, and any other meetings to review hazardous materials control issues in connection with the progress of the Work. The initial site inspection shall be as described below. Other meetings to monitor hazardous materials control issues associated with the Work, including any briefing of DEP personnel, including, but not limited to, facility managers and supervisors, shall be scheduled as necessary.

a. Initial Site Inspection: Within five (5) business days after approval of the environmental health and safety (EHS) Resources, or an agreed upon timeframe, the Contractor, the Engineer, and applicable DEP personnel shall perform an initial site inspection to review all the Work areas that will be affected by contaminated, potentially hazardous and hazardous materials. EHS Resources are defined in Section 01 35 27 – Environmental Health and Safety Requirements.

1) Initial site inspection shall be organized by the Contractor who shall contact DEP, and the Engineer to determine the representatives that should attend.

2) A minimum of one representative from each party shall be present for the inspection.

3) Competent Persons shall lead the site inspection.

4) Sampling outside of the Work to be performed may not be performed without DEP approval.

5) A site inspection report shall be distributed by the Contractor at the beginning of the site inspection. The site inspection report shall include drawing(s) and associated text that describes the work in sufficient detail to aid in the site inspection.

6) The Contractor shall note in the site inspection report any special requirements that they have to perform their Work during the inspection.

7) The Contractor shall prepare and distribute a summary of the site inspection and any comments noted during the inspection to all parties present at the site inspection.

8) In the event that the initial site inspection does not satisfactorily identify the contaminated, potentially hazardous, and hazardous materials potentially affecting the Work, follow-up inspection(s) shall be organized and held as required.

B. Unforeseen Hazardous Material

1. The Work Sites may contain unforeseen hazardous materials. When a potentially hazardous material that was previously unforeseen is discovered or an upgrade of its EHASP is necessary for managing unforeseen hazardous material, the Engineer will direct the Contractor to engage the services of a hazardous materials specialist to perform the necessary investigation, develop a remediation plan, and perform the remediation work. Additionally, the Engineer will direct the Contractor to update its EHASP as necessary.

2. The Contractor shall be responsible for identifying previously unknown and suspect hazardous materials as they are encountered via implementation of the approved sampling plan. Indication of the presence of hazardous materials, including but not limited to odorous or stained soils, sediment or liquids, mercury sources and suspect asbestos-containing materials must be immediately reported to the Engineer. All Work in the area shall stop until otherwise directed by the Engineer.

3. In the event that hazardous material is detected, the Engineer will provide the Contractor with a scope of work for the remediation services and direct the Contractor to obtain cost proposals for such work from at least three (3) hazardous material specialists unless otherwise required by the DEP depending upon the magnitude and timing of the work. The Contractor shall submit the proposals, indicating which hazardous material specialist the Contractor proposes to engage, to the Engineer within ten (10) business days of receiving the scope of remediation work. The Engineer shall review the proposals and approve such selection or direct the Contractor to submit an alternative selection or obtain additional proposals. Remediation work shall not commence until the Contractor receives written notice from the Engineer to proceed with the work. As directed by the Engineer, pre-remediation inspections and coordination may also be required, in a manner similar to the procedures for known hazardous materials.

4. Soils testing and analysis shall be performed in accordance with Section 02 24 20 - Soil Sampling and Analysis. In the event that hazardous levels of lead are detected in soil, the DEP will provide the Contractor with a Community Air Monitoring Program (CAMP) to include particulate air monitoring. The Engineer will direct the Contractor to obtain cost proposals for work of the CAMP from at least three (3) experienced firms unless otherwise required by the DEP depending upon the magnitude and timing of the work. Within five (5) business days of receiving the CAMP, the Contractor shall submit the cost proposals to the Engineer, indicating which

firm the Contractor proposes to engage. The Engineer shall review the cost proposals and approve such selection or direct the Contractor to submit an alternative selection or obtain additional proposals. CAMP work shall not commence until the Contractor receives written notice from the Engineer to proceed with the work.

5. The Contractor shall not initiate or proceed with any other Work in areas associated with contaminated, potentially hazardous, or hazardous materials until these materials have been removed from these areas or managed, in accordance with the following Specifications:

   a. Asbestos-containing material shall be handled in accordance with Section 02 82 05 – Asbestos Management.

   b. Mercury-containing equipment and material shall be handled in accordance with Section 02 84 10 – Mercury Management.

   c. Lead-containing paint shall be handled in accordance with Section 02 83 05 – Lead Management.

   d. PCB-containing material shall be handled in accordance with Section 02 84 05 – PCB Management.

   e. If not handled under the above Sections, universal waste and other regulated wastes shall be handled in accordance with Section 01 74 20 – Construction Waste Management.

6. Some of the remediation work may be critical to maintaining construction schedules. When this occurs, the Engineer will establish a time for completion.

C. Hazardous Waste Management and Regulatory Compliance

1. Hazardous Waste Contingency Plan and Hazardous Waste Minimization Plan

   a. If the location of the project is on a site which has a Large Quantity Generator (LQG) status or subsequently obtains LQG status during the course of the Work, then the Contractor shall conform to the requirements of the Hazardous Waste Contingency Plan and Hazardous Waste Minimization Plan for that site.

2. Hazardous Waste Storage Compliance

   a. The Contractor shall maintain compliance with hazardous waste storage requirements at the Work Site. Storage areas and inspections of storage areas must comply with the hazardous waste regulations detailed within 6 NYCRR Parts 370 through 375.

3. Waste Management Records

   a. Disposal of wastes generated by remediation Work will be based on the results of testing and shall be at a site permitted to accept such waste by the U.S. Environmental Protection Agency (EPA) or an

authorized state or local government agency. The Contractor shall provide remediation waste profiles for DEP signature as generator, permit documentation required for the selected Treatment, Storage, or Disposal Facility (TSDF) to receive these wastes, and the transporter's 6 NYCRR Part 364 Waste Transporter Permit(s) required to transport wastes to the TSDF. The Contractor will conduct due diligence of the TSDF, including a list of violations received. The Contractor shall submit a facility letter of acceptance. The Contractor shall also provide advance copies of the waste manifest(s) and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form(s) for the Engineer's review and approval. The Contractor will keep and update a Hazardous Waste Inventory Log and will document weekly inspections by a Competent Person in the management of hazardous waste.

b. On the date of shipment, the Contractor shall submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with federal and state requirements, to the DEP for signature. Copies of completed and signed waste manifests from TSDF's shall be provided to the Engineer as soon as possible but no later than thirty (30) days of waste shipment offsite.

4. Changes to Hazardous Waste Generator Status

a. The Contractor shall be aware that work activities may result in a change to the Work Site's hazardous waste generator status. Compliance with the revised generator status is required.

5. Hazardous Waste Regulatory Program Fees and Taxes

a. The Contractor may be directed to pay the New York State Department of Taxation and Finance for special assessments on hazardous waste generated at the Project Site or the NYSDEC regulatory program fees charged to the facility operating at the Site. When directed by the Engineer, the Contractor shall pay the amount indicated within 48 hours of notification. The Contractor will be reimbursed for the amount paid, with no provision for overhead and profit, from the allowance provided for unforeseen hazardous materials remediation as specified in Section 01 27 00 – Measurement and Payment.

1.06 QUALITY ASSURANCE

A. Remediation plans for unforeseen hazardous materials shall comply with all applicable requirements of federal, state, and local hazardous waste regulations and shall include, but not be limited to the following:

1. Identification of hazardous and regulated/non-hazardous wastes associated with the Work.

2. Estimated quantities of wastes to be generated and disposed of.

3. Names and qualifications of each Subcontractor that will be testing, transporting, storing, and disposing of wastes. Include the facility location and a 24-hour telephone contact number and applicable transporter and TSDF permits, EPA Identification Numbers, and insurance certificates.

4. Names and qualifications (experience and training) of personnel who will be responsible for on-site management of hazardous wastes.

5. Detailed description of the containment and removal procedures.

6. Spill prevention and cleanup contingency measures to be implemented.

7. Work plan for waste management, on-site storage, removal and disposal.

8. Detailed schedule indicating the beginning and completion dates for each activity and each Work area, including time for clean-up, inspection, and monitoring activities.

1.07 SUBMITTALS

A. The following items shall be submitted as described above for the Engineer's approval:

1. Initial Site Inspection Report and Summary Site Inspection Report

2. Remediation Plan for Unforeseen Hazardous Materials, when required.

3. Three (3) cost proposals from hazardous materials specialists for remedial action work, when required.

4. EHASP upgrades as needed in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

B. The Contractor, when requested by the Engineer, shall provide additional copies of all reports and related materials as may be needed for conferences with the Commissioner and other agencies having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Site Security Procedures
2. Site Video Surveillance
3. Security Guard Services

B. Contractor shall comply with all Site Security Procedures described herein.

C. The Contractor shall provide electronic safety and security equipment for physical security, access control, intrusion detection and video surveillance purposes as specified and directed by the Engineer.

D. The Contractor shall furnish personnel, uniforms, equipment and supplies necessary to provide Security Guard Services at the Site, as described herein. The services shall be provided as specified and as directed by the Engineer.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	DESCRIPTION	2
1.06	Quality Assurance	6
1.07	Submittals	13
1.08	Delivery, Storage, and Handling	15
1.09	Spare Parts, Special Tools, and Supplies	15
1.10	Warranty	15
PART 2	PRODUCTS	15
2.01	Manufacturers	15
2.02	Materials / Equipment	15
2.03	Fabrication / Assembling / Finishes	21
2.04	Source Quality Control / Shop Tests	21
PART 3	EXECUTION	21
3.01	Examination / Preparation	21
3.02	Application	21
3.03	Field Testing / Quality Control	30
3.04	Startup / Demonstration	31
3.05	Adjusting / Protection / Cleanup	31

F. Attachments

1. NYC DEP Bureau of Police & Security Contractor Site Security Guidelines Water Supply / Water & Sewer / Sewage Treatment Plant Sites

a. In the event that the BPS Guidelines and this Section or the related Contract Drawings differ, the BPS Guidelines shall take precedence.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

1.04 REFERENCES

A. Definitions

1. Visitor: A person visiting the project Site who is not employed by the Department of Environmental Protection, New York Police Department, Fire Department of New York, emergency medical services, the Engineer, the Contractor, or Subcontracted to the Contractor.

1.05 DESCRIPTION

A. Site Video Surveillance

1. The Contractor shall provide Site video surveillance to cover the project area. Site video surveillance shall be provided 24 hours per day, 7 days per week, 365 days per year.

2. Site video surveillance recordings and live viewing capability shall be available via internet browser for the duration of the project and at the direction of the Engineer.

3. Site video surveillance shall be provided where existing or new infrastructure is exposed by construction operations including excavations, demolitions, roof or floor slab removal, etc.

4. Access to Site video surveillance at all times shall be provided to the Engineer, DEP Police Chief, and DEP Police Deputy Chief.

5. Site video surveillance shall be password protected.

a. Each user must have a unique user ID and password to login. Shared or generic accounts are prohibited.

b. All user accounts should be standard accounts with the minimum necessary access. Administrative access should only be granted where absolutely required.

c. Passwords must be a minimum of 8 characters for regular account and 15 characters for administrator privilege account, containing at least one upper case letter, one lower case letter, one number and one special character.

d. Login credentials must be removed for any user whose responsibilities on the project change, making it unnecessary to have video access and/or those whose involvement with the project ends.

6. DEP will have the option to make Site video surveillance equipment and system permanent at end of construction.

B. Prior to the start of Work, the Contractor shall appoint a Security Point of Contact (SPOC) to liaise with DEP Bureau of Police and Security (BPS) on all security related matters. An alternate SPOC (ASPOC) shall also be appointed by the Contractor in the case of SPOC absence or unavailability. SPOC/ASPOC will be responsible for ensuring Site security compliance.

C. Security Guard Service

1. The Contractor will be directed in writing by the Engineer as to the date of commencement of the security services two (2) weeks prior to starting the actual services. Once the Security Guard Service starts, it shall remain in continuous operation until project close-out.

2. The Contractor shall employ Security Guard Services specifically and exclusively to safeguard the Site and prevent access by unauthorized persons in accordance with General Conditions, Article 9. The Security Services shall be Normal Project Working Hours as defined in Section 01 14 00 – Work Restrictions. The Security Services shall include at least one (1) uniformed security guard per shift at each guard booth.

3. Guards shall be stationed at a guard booth. Gates 16 and 19 are to be manned by the Contractor's security forces as needed to accommodate on-site activities. Security services at Gate 16 and 19 are currently provided under the CAT-212E Contract but will be transferred to the CAT-475 Contract upon issuance of a notice to proceed. In addition, the Contractor shall provide security guards on-site each shift during a 24-hour day at other locations when ongoing work requires access to those areas.

4. Throughout construction, maintenance, operation, and repair of the Gates 16 and 19 guard booths and the crash-rated gates shall be the Contractor's sole responsibility. In the event that an existing primary hydraulic crash-rated gate becomes inoperable, the Contractor shall immediately initiate repairs while providing temporary access control using the existing spare manual crash-rated gate. At the completion of construction, Contractor shall restore the guard booths and gates to condition acceptable to the Engineer and BPS.

5. Guards shall be unarmed.

6. The security guard shall be provided based on an 8-hour shift. No security guard shall be scheduled by the Contractor for more than twelve (12) hours in any twenty-four (24) hour period, including placements at other assignments.

7. Security measures and deterrents to protect the Site infrastructure from unauthorized vehicles, pedestrian traffic and construction accidents are to be provided where Site existing infrastructure is exposed by construction operations including excavations, demolitions, roof or floor slab removal, etc.

8. The Contractor shall be responsible for the necessary supervision of the guards and shall make unannounced visits to the property, for the purpose of monitoring each guard’s performance.

    a. Supervision of all security personnel must also be provided by the entity that directly employs them.

9. All security personnel must pass a security clearance from the DEP Police Detective Bureau and obtain a DEP Non-Employee Photo Identification Card. DEP Non-Employee Photo Identification Cards will be issued by DEP Police Detective Bureau or at the DEP Security Office, 96-05 Horace Harding Expressway, Corona, NY.

    a. Security clearances are valid for one year after which re-clearance is required.

    b. DEP Non-Employee ID Card must be worn on the outermost garment and fully displayed by all security personnel while on Site.

    c. New York State Guard Licenses must be in possession of the guard while on duty and presented on demand when requested by an authorized person.

10. The Contractor shall ensure that meal breaks are provided for each guard and shall provide a relief guard during the guard’s meal break.

a. This requirement may be waived by the Engineer during non-working construction hours as long as the Site can be satisfactorily secured, i.e. gates/doors locked, interior alarm system activated.

b. Guard will be required to punch out upon taking break, and punch in at the end of break.

11. Contractor and/or Security Guard Company shall have trained back-up guards and supervisors available to ensure continuous, uninterrupted service in the event a guard and/or supervisor is not present for duty.

12. All Work pursuant to this Contract shall be performed in compliance with all applicable Federal, State and local laws and regulations.

13. Security guard shall have a means of communication to contact 9-1-1, DEP Police where applicable, and any emergency contacts that DEP may provide at all times.

a. VOIP telephone service to each security guard booth remains from prior construction contracts and shall be taken over by the Contractor. In the event of a reportable issue, DEP Police are to be contacted using the VOIP telephones.

b. If a cell phone is used for communication, this designated phone must remain with the post at all times while security coverage is being performed.

14. If the Site security procedures require, in addition to performing security functions, each security guard may be expected to perform the duties of a Fire Guard and be certified as such per Section 1.06 (A)(2)(n).

D. Compliance with DEP Bureau of Police and Security Contractor Site Security Guidelines

1. The Contractor shall comply with the DEP Bureau of Police and Security Contractor Site Security Guidelines, attached at the end of this Section.

2. Security clearance or approval for temporary access shall be obtained from DEP Bureau of Police and Security for all Contractor personnel working at the Site(s) before personnel will be permitted to access the Site. Refer to the DEP Bureau of Police and Security Contractor Site Security Guidelines for:

a. Procedures required to obtain security clearance and associated Security Clearance Form; and

b. Procedures required to obtain approval for temporary access and associated Temporary Access Form.

1.06 QUALITY ASSURANCE

A. Qualifications for Security Guards

1. The Contractor shall employ a Security Service Firm that is fully licensed under New York State Law to provide the required security guards. The Contractor shall provide a copy of a valid New York State Guard Service License prior to commencement of the Work.

   a. The Security Guard Firm may not subcontract any of the Work.

   b. The collaboration of two or more Security Guard companies as a joint venture is permissible as long as there is a common name and uniform with an established single responsible person in charge or all security personnel posted.

   c. Comply fully with the New York State General Business Law (GBL) Article 7 and 7-A Entitled Security Guard Act.

   d. Possess a valid license issued by the New York State Department of State ("NYSDOS License"), to act as a Private Investigator or Watch Guard and Patrol Agency.

   e. Be fully licensed under New York State Law General Business Law Article 7, Section 70, and Licenses Paragraph Number 2 entitled Private Investigators and Watch, Guard and Patrol Agencies, and Article 8 entitled Process Server to provide the required security guards. The Contractor shall provide a copy of the NYSDOS eleven (11) digit unique identification number prior to commencement of the Work.

   f. The City will immediately terminate the Subcontract and Contractor shall engage a new subcontractor if the NYSDOS License is suspended or revoked for any reason. The Contractor cannot substitute another Private Investigator and Watch, Guard or Patrol Agency License if the Subcontractor's NYSDOS license is suspended or revoked.

   g. The Security Service Firm shall have been engaged in the business of providing uniformed security guard services for a minimum of five (5) years and shall provide details of this experience prior to commencement of the Work.

2. The Contractor shall ensure that all assigned security guards are licensed security guards registered under New York State law and meet the following criteria:

   a. Guards shall be at least eighteen (18) years of age.

b. Possess a high school diploma or possess a General Equivalency Diploma.

c. Have at least one year of experience as a Uniformed Unarmed Security guard including a minimum of 1,750 hours of service preferably in a similar setting. This requirement can also be waived by the BPS Security Division at its discretion or for candidates with prior military service with an honorable discharge (DD214).

d. Possess a valid current New York State issued Driver License, Learner's Permit or Non-Driver I.D. card.

e. Have a current New York State Security Guard License

f. Possess and maintain valid Certification for the specific position to which they are assigned. Some examples include: FDNY Handle Motor Fuel-Gas Station P-15 Certification, Certificate of Fitness for Fireguard Shelters F-44, or MARSEC (Maritime Security)/TWIC Transportation Worker Identification Credential certifications. The Contractor is responsible for determining and complying with correct certification.

g. Guards shall be able to understand, speak, read and write English fluently. They shall be able to intelligently communicate with Visitors and prepare accurate written reports of any incidents.

h. All guards shall have undergone fingerprinting pursuant to New York Department of State, Division of Licensing Services regulations.

i. Guards shall be in excellent physical condition and shall supply medical certification of fitness and good health prior to assignment. This shall include an annual medical examination including a urine drug screen test performed by a licensed testing laboratory approved by the City. The drug screen test shall test for the following substances: amphetamines, barbiturates, benzodiazepines, cocaine, marijuana, methadone, methaqualone, opiates, PCP's propazphene.

j. Guards shall have no record of mental illness, history of residence in a psychiatric institution, or history of drug or alcohol abuse.

k. Guards shall not have been convicted of a felony or other criminal offense which in the NYS Department of State determination would inhibit the guard's ability to perform the duties of a security guard in a reliable, competent and trustworthy manner in accordance with the Contract Documents.

l. Guards shall perform their duties in full uniform.

m. Guards shall possess an OSHA Construction Safety and Health certificate (10 hour minimum)

n. Guards must have the appropriate Fire Guard Certification applicable to the construction Site they are assigned to. Contractor is required to determine certification required by the local authority having jurisdiction. (Examples of such certifications include Certificate of Fitness (CoF) F01 – Citywide Fire Guard for Impairment, F02 - Fire Guard of Shelters, F60 – Fire Guard for Torch Operations, F92 – Supervise and Fire Guard Boatyards and Marinas).

3. Any security guard found not to meet the above qualifications shall be immediately replaced within 24 hours upon the direction of the Engineer. The replacement shall be made so that no interruption in security guard coverage takes place.

B. Training

1. Contractor shall ensure that all guards employed under this Contract receive training as per Article 7-A, Section 89-n of the New York State General Business Law and the New York State Security Guard Act of 1992.

2. All Site security personnel must have received the following training prior to posting:

a. State Required training:

1) 8 Hour Pre-Assignment

2) 16 Hour OJT (on the job training)

3) Current 8 Hour Annual

b. Training must also include the following:

1) Proper confrontation to include procedures for courteous reception and questioning of individuals; procedures to restrict ingress and egress routes while maintaining a professional bearing and decorum; and procedures to conduct body and package searches in an appropriately non-aggressive and inoffensive manner.

2) Radio communication principles and radio use

3) Legal restriction of arrests, searches and seizures for New York State

4) Use of force for New York State

5) Procedures to be followed in reporting a violation of law to a duly constituted law enforcement agency

6) Procedures for reporting an unusual occurrence incident, including familiarization of the incident report and the "who, what, when, where and why" method of reporting

7) Recognition of security and safety hazards, and fire protection and prevention including fire alarm procedures

8) Appropriate use of installed fire equipment and emergency evacuation procedures

9) Emergency response and evacuation procedures;

10) Bomb threat procedures;

11) Fire alarm procedures and appropriate use of installed fire equipment

12) Ethics and law

13) Identifying and reporting sexual harassment and discrimination and workplace violence

14) Prohibition of Fraternizing with DEP's and contractor's staff and visitors

15) Terrorism Awareness Training

16) Observation and detection of potential hostile surveillance

17) Operation of an x-ray machine

18) Operation of proper screening with a magnetic wand

19) Operation of a magnetometer (walk through metal detector)

20) Operation of electronic barriers and gate

21) Control center operations where applicable

3. Copies of all applicable training materials, including examinations, must be provided anew to DEP whenever changed.

4. Records of training sessions must be maintained by the Contractor. Copies of training session records must be sent to DEP Project Manager within seventy-two (72) hours of the completion of training.

5. Prior to posting, all security guards must receive a site specific 2-hour orientation conducted by the DEP BPS Security Manager and/or authorized representative(s).

a. This requirement may be waived on a site-by-site basis at the discretion of DEP BPS Director of Security and/or appointed authorized representative(s).

b. Subsequent security guards assigned to the Site after the beginning of security coverage shall receive a similar orientation by the Contractor SPOC/ASPOC. The Contractor must appoint a "Trainer" to conduct orientations for future security personnel assigned to the Site.

6. 2-Hour Orientation - Requirements

a. Security Personnel Requirements

1) Roster of 6 security guards shall be sent to initial training, to account for future sickness, vacation, resignations, etc. at the post

2) Attendees shall possess a of NYS Security Guard License

3) Inquire if any are active or retired Police Officers and of gun possession

4) Authorized representative of the security company shall be in attendance

5) Prime Contractor SPOC or authorized representative shall be in attendance

b. Other Requirements

1) Temporary guard booth shall be in place and powered.

2) 24-hour means to communicate with 911 and DEP Police Ashokan, Eastview, or Hillview Precinct (if upstate or at designated In-City sites)

3) Working flashlights must be available.

4) 24-hour contact information for the Security Company shall be provided.

5) Means of time accountability shall be in place, i.e., time clock that is punched every hour and generates report.

7. 2-Hour Orientation Agenda must include at a minimum:

a. Introduction

b. General Requirements:

1) Expectations and responsibilities for security officers

2) Review of requirements

c. Specific Post Orders

1) Requirements of the site(s)

2) Patrol / Access Control Procedures

3) What to look for

4) How to contact DEP Police (at sites where applicable)

5) Use of Log Book

6) Recording Key Punches

7) Reporting Spills

8) Evacuations

d. Tour of Site(s):

1) Familiarization of post and surrounding area

e. Distribution of Security Post Orders:

1) Contractor Security Point of Contact (SPOC)/(ASPOC)

2) Authorized Security Company Representative

3) Post

f. Acknowledgement Statement Form: Upon the completion of the orientation, the following must sign the form:

1) Security Guard(s)

2) Authorized Security Company Representative

3) Contractor (SPOC)/(ASPOC)

a) The originals shall be submitted to the Engineer.

8. Annual Training Requirements:

a. 8-Hour Annual In-Service Training (all security personnel both armed and unarmed)

b. 8-Hour Annual Firearms Training (all armed security personnel)

C. Qualifications for Security Guard Supervisors

1. In addition to meeting all the qualification requirements of a Uniformed Unarmed Security Guard, Supervisors shall meet all of the following qualifications:

a. Be at least 21 years old

b. Have at least one year of supervisory experience in any field; and

c. Have a minimum of two (2) years of additional experience in any one or any combination of the following:

1) Experience as a security guard with a documented successful work history

2) Experience as an armed guard/watchman

3) Experience in the Armed Forces, Military Reserves, National Guard or as a State Guard, with honorable discharge or equivalent

4) Experience as a probation officer, corrections officer, police officer, or park ranger, attendance at an accredited institution of higher learning in criminal justice, police science or a related field (completion of 24 credits may be substituted for one year of required service.

D. Standards of Conduct

1. Contractor(s) shall ensure and certify that all assigned staff complies with the following:

a. Meet the requirements of all federal, state and local laws, including the N.Y.S. General Business Law § 70 et seq. and § 89-e et seq., and any successor legislation, including but not limited to, the satisfactory completion of the specified fingerprint checks

b. Have no physical conditions that would hamper the performance of assigned duties

c. Be able to stand for a minimum of four (4) consecutive hours

d. Be free from communicable disease

e. Hear within normal speech range and volume

f. Possess a valid social security number

g. Not be under indictment for any felony or any other offense specified in the N.Y.S. General Business Law §§ 81 or 89-h

h. Be physically able to wear and to be properly trained in the use of all protective equipment

i. Possess mental alertness and emotional stability

j. Have passed a background investigation conducted by the Contractor(s), consisting of: FBI fingerprint check; seven (7) year prior employers check; out-of-state criminal records check; personal

references check; New York State criminal background checks; and driver's license check

k. Have tested negative, both prior to employment and on an annual basis thereafter, to random Controlled Substance Use (CSU) testing, for the presence of the following substances and/or their metabolites on a clinical drug test administered by a lab licensed by the State of New York to administer such examinations: amphetamines; barbiturates; benzodiazepines; cocaine; cannabinoids; methadone; methamphetamines; opiates; phencyclidine; propoxyphene; and tricyclic antidepressants. Copies of the test results must be placed in the employee's personnel file and be provided to the User Agency upon request.

l. Annual CSU testing required under these Contract(s) will be of a random nature, whereby CSU testing is carried out each year on a random date, without prior notification to the respective employee or their supervisor.

m. All CSU testing will be conducted in accordance with all legal standards, as required under Local, State and/or Federal laws for the industry.

n. All Security Personnel testing positive will be immediately removed from their post and eliminated from any future assignments under this Contract.

o. In the event a security guard is required to ingest prescription medication, it is the Contractor's responsibility to ensure that the guard is fit for duty and that the appropriate documentation is made available to the DEP. Such medication must be carried in the original prescription container, with the pharmacist's label affixed thereto. specifying the pharmacy name, prescription number, doctor's name, drug name and control number. Additionally, it is the Contractor's responsibility to ensure that guards are not assigned for duty while under the influence of any medication that could impair their ability to carry a firearm and/or perform required job duties.

1.07 SUBMITTALS

A. Within 14 days after the Notice to Proceed, the Contractor shall submit to the Engineer the Security Surveillance Plan for approval.

B. Within thirty (30) days of the Notice to Proceed, the Contractor shall submit to the Engineer the Security Service Firm for approval.

C. Within twenty-four (24) hours of retaining the Security Service Firm, the Contractor shall be required to maintain a personnel folder on each security guard employed under this Contract. Only guards for whom the following information is submitted may be assigned. The folder shall contain the following information:

1. Guard's name
2. Home address
3. Date of birth
4. Duplicate photo ID card
5. Social security number
6. Copy of employment application
7. Copy of New York State Division of Licensing Application Form 307
8. Copy of birth certificate
9. Copy of high school diploma or General Equivalency Diploma
10. Military record (if applicable)
11. Documentation of prior employment
12. Copy of New York State fingerprint card
13. Record of security training, pursuant to the Security Guard Act to include 8-hour annual training for the duration of the Contract.
14. Medical certification of fitness and good health
    a. Contractor and/or Security Guard Company shall ensure that all guards and supervisors undergo and pass a physical exam administered by a physician licensed to practice medicine in the State of New York. Such physical exams shall take place no earlier than twenty (20) days before Contractor and/or Security Services Company hires such guard or supervisor.
    b. Contractor and/or Security Services Company shall further ensure that all guards and supervisors currently employed by them, successfully pass an annual post hiring medical examination administered by a physician licensed to practice medicine in New York State. Such annual physical exams shall take place within (30) days of the anniversary date of the prior physical.
15. Drug screen test results for the past 12 months or since employment, whichever is shorter.
16. Result, if any, of criminal record check.

17. Proof of successfully passed security clearance from DEP BPS Police Detective Unit.

D. The above referenced files shall be made accessible and delivered to the Engineer within twenty-four (24) hours of the request.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reporting

1. All unusual occurrences that require a security guard to take official action must be reported immediately to the police and the Engineer as appropriate.

2. It is the responsibility of the Contractor to keep all reports in a binder according to location.

B. Site Security

1. Additional Security

a. Should the Contractor consider the security requirements outlined above inadequate, it may provide such additional security as it deems necessary. The additional cost of such approved increased protection shall be paid by the Contractor.

b. Nothing contained herein shall diminish in any way the responsibility of the Contractor for safeguarding and protecting its own personnel, work, materials, tools and equipment.

c. Warning signs, lanterns and other devices shall be provided and maintained as required for protection of the public and Site working personnel. The cost of providing additional Site security shall be included by the Contractor in the price bid for the Contract.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Video Surveillance

1. Pan-Tilt-Zoom (PTZ) Cameras
    a. Outdoor PTZ IP Security Camera
        1) Resolution: 3840 x 2160 UltraHD 4K to 640 x 360.
        2) Lens: f=3.9 – 46.8 mm, F1.8 – 2.0 autofocus, automatic day/night, horizontal field of view: 70.7° - 6.2°.
        3) Minimum illumination: Color - 0.45 lux at 30 IRE F1.8, B/W – 0.03 lux at 30 IRE F1.8.
        4) Pan/tilt/zoom: Pan: 360° endless, 0.05° - 750°/s. Tilt: plus 20 to minus 90°, 0.05° - 500°/s, 12x optical zoom and 12x digital zoom total 144 zoom.
        5) Video compression: H.264 (MPEG-4 Part 10/AVC), Motion JPEG.
        6) Casing: IK08, IK10 housing and mounting. IP66 and NEMA 4X-rated repaintable metal aluminum casing, polycarbonate clear dome.
        7) Power: High Power over Ethernet, max. 37W, High PoE Midspan 1- port: 100-240V AV, max. 74 W.
        8) Operating conditions: -40 °F to 140 °F, with 60-W midspan.
    b. Outdoor Fixed IR Illuminated Bullet Camera
        1) Resolution: 3712x2784 10 MP to 160x90.
        2) Lens: Canon 12–48 mm, F1.7–4.0, 4K Horizontal field of view: 90°–21°, Vertical field of view: 49°–12°, 10MP Horizontal field of view: 86°–20°, Vertical field of view: 62°–15°, Autofocus (zoom triggered), auto-iris, automatic day/night.
        3) Day and night: Automatically removable infrared-cut filter.
        4) Minimum illumination: Color: 0.03 lux at 50 IRE F1.7, B/W: 0.006 lux at 50 IRE F1.7, 0 lux with IR illumination on
        5) Video compression: H.264, Motion JPEG.
        6) Casing: IP66-/IP67-, and NEMA 4X-rated, IK10 impact-resistant aluminum enclosure with integrated dehumidifying membrane, weather shield with black anti-glare coating Color: White NCS S 1002-B.
        7) Power: Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4, Typical 13.3 W, max 24.0 W.

8) Operating conditions: -40 °F to 140 °F.

2. Analytics

a. Motion detection

1) Onboard Analytics: Include video motion detection.

3. Video Storage

a. Video storage shall be local recording to a DVR/NVR with both local and internet-based access.

b. Minimum recording retention time is 30 days.

c. Power: 24-hour power supply battery backup.

B. Security Guards

1. Uniform and Appearance

a. The Contractor shall furnish distinctive and appropriate complete uniforms to all security guards and supervisory security personnel at no cost to DEP. All assigned personnel must have standard, matching uniforms. All supervisors' uniforms must be distinctive from guards' uniforms, (i.e., contain different color shirt than guard) and contain rank insignia.

b. The uniform and appearance shall be as follows:

1) Uniform shirts (long sleeve or short sleeve, depending on weather conditions). The Contractor(s)' shoulder patch shall be on the sleeves and a security square badge with name plate shall be worn on the front

2) Uniform trousers;

3) A black tie (snap or button type only);

4) Black shoes

5) For staff assigned indoors, a uniform blazer with the Contractor's shoulder patch on the left breast pocket and a metal badge with name plate to be worn on the front;

6) For staff assigned outdoors, a uniform jacket with the Contractor's shoulder patch on the sleeves and a metal badge with name plate to be worn on the front, and a cap with badge (baseball style caps are acceptable) – the cap must be worn front-facing and "squared," not tilted or slanted.

7) Appropriate clothing for inclement weather, i.e. rain boots, rain coat, winter hat (must clearly identify the wearer as a security guard).

8) Appropriate safety equipment that site requires in performance of duties, i.e. hard hat, safety vest, safety goggles, steel toed boots (must clearly identifies the wearer as a security guard.)

c. All items of uniform shall be maintained in a clean, well pressed condition.

d. Contractor must provide appropriate fitting uniform for guards who are pregnant.

2. Equipment

a. Working flashlight – with replacement batteries available

b. Post Log Book

1) Contractor shall provide log books according to specifications: 8.5 inches by 14 inches hard covered bound with lined pages inside

2) Must be present and remain at security post.

3) All log entries made by security officers must be in permanent black ink. Use of correction fluid such as Wite-Out is not permitted. Mistakes in entries are to have a single line drawn through them and initialed.

4) Security Supervisors and those charged with overseeing security at a site (SPOC/ASPOC) must sign their names and entry and exit times in the logbook in red ink.

5) Log books shall be continuously maintained by Contractor's personnel and shall contain the following chronological entries:

a) Signature of each employee coming on duty

b) Signature of each employee going to and from meal break

c) Signature of each employee going off duty

d) Results of all patrols

e) Documentation of all incidents, which must include the following:

(1) Time of incident(s)

(2) Description of incidents and their outcome

(3) An account of Security Guard actions during the incident(s)

(4) Names of persons and/or entities contacted, arrival and departure times of any police units, fire department and/or other respondents, and signatures of the Contractor(s)' supervisory personnel, and DEP Project Manager and DEP Director of Security and/or appointed authorized representative.

(5) Notations of Security Guard actions during the incident(s)

f) Names of persons and/or entities contacted, arrival and departure times of any police units, fire department and/or other respondents, and signatures of the Contractor(s)' supervisory personnel, and DEP Project Manager and DEP Director of Security and/or appointed authorized representative.

g) Notations of supervisory visits during any shift must include arrival and departure times, nature of visits and areas visited.

h) Notes of all occasions when vehicles or personnel representing the NYC Police Department, the NYC Sheriff's Department or the New York State Police are observed entering or are present at User Agency sites. Notes must include the license plate numbers or vehicle numbers, if possible, time spent on and off the grounds, and details of any conversations held;

i) Notes of any emergency situations that occurs and an account of all developments and their resolution; and

j) Documentation of inquiries from news media, radio, or TV. All inquiries from Press, news media, radio or TV, etc., shall be directed to contact the DEP Press Office at (718) 595-7867

6) Log Books are the property of DEP and must be submitted to the designated DEP representative if so requested.

7) Only persons directly involved with security operations are authorized to read log book. Only authorized persons may remove log book from Site. Authorized persons are Bureau of Police and Security and OIG. Notification of removal and new location must be made to all parties above by authorized person removing log book

8) When completely filled, it must be turned over to most senior DEP Person in charge of security at the Site for proper storage (or DEP Resident Engineer).

C. Communication Equipment

1. Contractor shall possess device systems for use at each site as defined. In any facility or location where two or more guards are assigned to work simultaneously, the Contractor shall provide portable hand-held two-way radios for use by each guard. Contractor shall also provide appropriate training and accessories such as batteries, chargers, and carrying case. Such radios shall be fully operational at all times. The radio must be fully charged at the beginning of each shift. Such radios shall be licensed by the Federal Communication Commission (FCC) on a business or public safety band. Such radios and accessories shall be provided in sufficient quantities to ensure that there is at least one operable, fully charged radio and case for each guard and supervisor on each shift. DEP must approve all equipment prior to use.

2. DEP's BPS Deputy Commissioner and/or their authorized representative(s) may also require that one or more radios be made available to the DEP's management personnel, at no cost to DEP, to maintain contact with the Contractor's security guards on Site and to monitor their radio transmissions. Where radios are required for the DEP's personnel, such radios must be made to operate on the same frequency as that assigned to the guards and will include cases and fully charged operable radios on each shift. Upon completion of service, such radios will be returned to the Contractor.

3. In addition, Contractor shall supply least one (1) working cellular phone capable of transmitting and receiving calls at an assigned post for use by guards on duty. Contractor's personnel shall provide the phone number for the post cell phones to the DEP before each shift. All expenses associated with the use of cellular phones are to be assumed by the Contractor.

4. At Sites with no radio or cellular communication capability, Contractor shall provide a communication methodology to meet the DEP minimum

requirements for guards to contact 911 and necessary notifications at no additional cost to the City.

5. All communication equipment must be in good operating condition and shall be supplied with a necessary back-up source.

6. The communications equipment must be tested regularly to ensure its functionality at the Site. If not functioning, the Contractor is required to replace it within four hours. Testing and equipment replacement must be noted in the post log book.

D. Electronic Timekeeping/Guard Tour System

1. Provide Timekeeping/Guard Tour system (electronic, turnkey acceptable if conditions do not warrant electronic) that is accessible to DEP BPS Security Division when requested.

2. Must be able to operate in an all-weather environment.

3. Records of all tours are the property of DEP and must be made available and accessible to DEP Project Manager and BPS Security Division when requested.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Security Guard Duties and Responsibilities

1. Security guards shall use discretion, courtesy, tact, and necessary force when protecting DEP locations.

2. Reporting to Post – all security guards reporting to post shall:

a. Arrive at scheduled starting time neat and professional in appearance.

b. Be in complete uniform displaying company logo.

c. If arriving at post for first-time contact the most senior DEP person on Site responsible for security or Contractor SPOC/ASPOC

d. Obtain any other necessary information from prior shift.

e. Review Post Log Book from previous shift and print their name. Identify and be familiar with:

1) Summary of incidents that took place the previous shift

2) Ongoing situations

3) Actions pending

4) Special instructions

5) Check all required post equipment to make sure it is in working order. Report to most senior DEP person on Site responsible for security, prime contractor SPOC/ASPOC, and your company supervisor any equipment not working. Enter all information in Post Log Book.

f. Safeguard all keys and equipment used during the normal course of their duties:

1) A working phone both landline and/or cellular or Nextel

2) A working two-way radio if used

3) A working flashlight

4) Whistle

5) Log Book

6) Pen(s)

7) All job-related contract information including postings

8) Any other equipment assigned related to job duties, i.e. keys

3. Post Assignment:

a. Be familiar with all site-specific post orders (can be found at security post)

b. Follow Log Book procedures as outlined.

c. Shall protect persons or property from:

1) Harm

2) Theft

3) Other unlawful activity

d. Respond to a security system alarm

e. Observe, detect, and report unlawful or unauthorized activity

f. Control, by street or other patrol service, access to property including:

1) Employees

2) Contractors

3) Visitors

4) Vehicles

5) Traffic

g. Enforce security policies, rules, regulations and procedures.

h. Areas of responsibilities can include:

1) Site buildings

2) Existing assets

3) Trailers

4) Grounds

5) Appurtenances, and occupants

i. Protect areas of responsibility against:

1) Fire

2) Vandalism

3) Theft

4) Loitering

5) Trespass

6) Burglaries/Unlawful Entry

7) Bodily harm

8) Building systems malfunctions and deficiencies (water leaks, open windows, lights out)

9) Hostile surveillance

10) Terrorism threats

j. Assist in emergency evacuations, both drill and actual – know evacuation routes and primary/secondary assembly areas.

k. Respond to emergencies, summoning assistance and obtaining professional assistance, in accordance with DEP Site procedures, in the event of injury or illness to anyone on the protected premises

l. Assist DEP and public safety personnel in case of any emergency such as fire, bomb threat, assault, or civil disturbance.

m. Prepare reports to be submitted to DEP on accidents, fires, thefts, breaches in a building's security/ protection, building incidents and potentially hazardous conditions.

n. Perform other such duties as may be prescribed such as:

1) Attend to parking facilities

2) Escort duties

3) Observe/ screen Visitors

4) Issue passes

5) Check IDs

6) Operating vehicle barrier gates, magnetometers, security x-ray machines and handheld security wands

7) Controlling gates, doors and lighting as required

o. Conduct patrols as required and dictated by site-specific post orders.

p. Upon intrusion by an unidentified person, Security Guards shall make an inquiry as to the authorization to enter the premises and take the necessary action as follows:

1) Provide the individual with temporary identification, or

2) Request the intruder to vacate the premises, or

3) If a threatening situation or criminal activity occurs, notify 911 and DEP Police (if location is upstate or at a designated In-City Site) and other contacts as proscribed by site specific post orders.

q. Security guards going off duty shall pass along all relevant information and instructions to the relieving security guard prior to leaving any post.

r. A post is never to be left unattended without official permission except if at end of tour and no relief is scheduled.

s. Access control: Follow Site specific access control policies:

1) Identify all persons entering and leaving Agency construction locations and may be required to operate X-ray or scanning equipment in the course of maintaining access control, including the inspection of bags, packages, parcels, etc.

2) Perform vehicle inspections (interior, trunk, undercarriage, etc.) during heightened security alerts, or when instructed to do so. Any vehicle entering or exiting a DEP site is subject to a search.

3) Check for valid DEP identification cards of all personnel attempting to enter the Site on foot or in vehicle. Admit only those who are permitted to use this entrance.

4) Verify a person's right to enter the Site with appropriate DEP Site personnel and/or prime contractor SPOC/ASPOC if identification card cannot be presented or is expired. Confiscate any expired identification cards and return to DEP Security Office if post is In-City or DEP Police Detective Bureau if post is Upstate or at designated In-City Sites

5) Do not assume that anybody wearing an official-looking uniform or is driving a vehicle that appears official has a valid reason to enter the Site. Inquire with appropriate DEP Site personnel and/or Prime Contractor SPOC/ASPOC

6) Make sure that all non-Site personnel (including DEP Employees who do not work at the Site) sign in

7) Deliveries – Follow Site specific delivery procedures. Confirm and verify all deliveries with appropriate DEP Site personnel and/or prime contractor SPOC/ASPOC. Do not automatically assume that anybody wearing an official-looking uniform has a reason to enter the Site. Inquire with appropriate DEP Site personnel or Contractor SPOC/ASPOC

8) Deny access to unauthorized persons at all specified locations.

9) Removal of Property – Confirm a person's right to remove property from the Site. If uncertain, verify with appropriate DEP Site personnel or Contractor SPOC/ASPOC.

10) Check that Contractors are scheduled to work. Verify names of all contractor personnel, identification, and have all sign in. Have them wait to be escorted by a DEP person or Contractor SPOC/ASPOC unless directed otherwise by appropriate DEP Site personnel or Contractor SPOC/ASPOC.

t. Report all irregularities, suspected irregularities, hazards, and potential hazards to most senior DEP person on Site and /or Contractor SPOC and DEP Police (if location is upstate or at a designated in-City Site):

1) This means:

a) any situation that is not typically part of the normal course of operations observed, heard, or smelled at the Site;

b) Could possibly cause harm to a person;

c) Damage to Site property; or

d) Broken or malfunctioning equipment.

2) Immediately report all safety violations to DEP Project Manager or authorized representative(s)

3) Suspicious Behavior – defined as unexplained conduct. Report all suspicious, unusual, or dangerous activities to DEP Police (if location is upstate or at a designated In-City Site). Report also to most senior DEP person on Site and/or Contractor SPOC/ASPOC

a) This includes vehicles, people, sounds, smells, and spills.

4) In Emergencies, Dial 911 and DEP Police (if location is upstate or at a designated In-City Site at 1-914-593-7500 or 1-888-426-7433 without delay). Also notify most senior DEP person on Site and/or prime contractor SPOC

u. Press Inquiries / Requests for Information – Do not speak to any news/media/ or press person or any inquisitive citizen regarding any matter or matter of security pertaining to DEP: Instead:

1) Refer to DEP Press Office at (718) 595-7867

2) Notify DEP Police (if location is upstate or at a designated In-City Site) and/or most senior DEP person on Site, and/or prime contractor SPOC.

3) Log all observations and/or incidents occurring in the Post Log Book. Include names of all people notified with and if necessary all 911/EMS operator numbers and police badge numbers.

v. Answer all questions from the DEP regarding events witnessed at their work location whether or not those events directly involved the performance of their official duties.

w. Submit sworn statements regarding any incident witnessed by the guard involving the commission of a crime or the threat thereof.

x. Surrender to Office of Inspectors General (OIG) and law enforcement any documents, weapons or other evidence obtained while performing their official duties or while witnessing any events at their work locations during their assigned hours of work.

y. Cooperate fully with DEP and law enforcement in regard to any investigations, administrative, and/or judicial proceedings resulting from said investigations

4. Provide name, company, and location while reporting anything or answering post telephones or radios.

5. Upon completion of shift immediately leave the Site and do not remain in the work area.

B. Prohibited Post Behavior

1. While not an exhaustive list, below are examples of behaviors and item possession that could subject the security guard to immediate and prompt removal from the Contract and even arrest and criminal prosecution.

a. Reporting to work intoxicated or under the influence of any illegal drugs

b. Consuming or possessing alcohol or illegal drugs

c. Smoking inside Security Booth or onsite except in designated smoking areas

d. Being in possession of any non-job related issued weapon, even if legal. No firearms are permitted on DEP Property even with carrier's permit (exception are appropriately issued weapons to armed guards that are formally approved)

e. Sleeping of any kind or other inattentive behavior

f. Being in non-designated areas of the Site and / or unauthorized use to Site equipment

g. Being on Site when not on duty; guard must vacate Site when shift ends

h. Having personal visitors

i. Making personal phone calls except in an emergency

j. Leaving post without proper notification and authorization

k. Failure to follow job-related directions

l. Possessing or operating any device that distracts from post responsibilities

m. Plugging in of any non-job issued electronic equipment to a Site outlet

n. Revealing details about security procedures or unusual incidents to unauthorized persons

o. Speaking to the press or unauthorized persons

p. Any other conduct or items possessed not listed above that might compromise job performance.

C. Fire Guard Duties and Responsibilities

1. Fire Guards' responsibilities include reducing the threat of fires in a variety of locations within a facility. They are also responsible for ensuring that all fire safety regulations are obeyed.

2. Fire Guards are required when fire sprinklers are not installed or when fire sprinklers are malfunctioning, including at construction Sites.

3. Fire Guards must be present when an automatic fire protection system is shut down while being repaired.

4. Fire guards shall have ability to manually operate each alarm station on the premises.

5. Duties include, but not limited to:

a. Assist in the evacuation of the location in the event of fire or other critical situation.

b. Provide clear and concise instructions to building occupants to ensure safe and orderly evacuations.

c. In the case of a fire, responsible for activating the fire alarm; notifying the Fire Department and, if applicable, the facility's Fire Safety Director.

d. Direct fire fighters to the scene of the fire.

D. Security Guard Supervisor's Duties and Responsibilities

1. Supervisors shall direct and monitor the performance of security guards at the Sites, as directed by DEP, to ensure that security guards are performing their duties in accordance with the Contract.

2. Supervisors assigned under the Contract shall be the person designated, in writing, to have the authority and training to supervise all levels of employees on a day-to-day basis.

3. The Contractor and/or the Security Services Company shall be responsible for the necessary supervision of the Guards and shall make unannounced visits to the properties for the purpose of monitoring each guard's performance. A Supervisor's Report, summarizing their findings (including times and dates of visit), shall be submitted to the DEP Project Manager on a monthly basis.

4. The Contractor and/or Security Services Company shall provide a supervisor who shall randomly visit the Site at least once per week alternating between all three shifts. The supervisor shall sign in the log book in red ink at the security post provided upon arrival, the DEP visitor log in the DEP Trailer, and communicate with DEP Project Manager. The supervisor will ensure all employees are present, attentive to their duties, and in conformance with the requirements of the Contract.

5. Supervisors shall make unannounced inspections of guards at the Site a minimum of at least once within a twenty-four (24)-hour rotation in order to ensure that the guards are acting in conformance with terms and conditions of the Contract.

6. Supervisors shall monitor to ensure that the guards are properly uniformed, alert and aware of and performing the required duties.

7. Supervisors shall not simultaneously perform the duties of security guard.

8. A written report, to include the date, time, and results of supervisory inspections shall be transmitted electronically to DEP Project Manager within three (3) days following each inspection. Supervisors shall note their times of arrival and departure in the log book provided by DEP as well as in their Memo Book and must punch in and out on a time clock, if/when required.

E. Rejection/Dismissal of Staff

1. Designated officials of DEP (Project Manager and/or authorized representative(s) may reject staff for any reason.
2. DEP may reject, dismiss or request removal of any personnel supplied by the Contractor and/or Security Guard Company from their assignment by notifying the Contractor. Upon such notification, Contractor shall be required to remove the employee(s) immediately or by such time as is designated by DEP.
3. Any guard or supervisor who has been rejected by DEP shall not be redeployed to any other DEP Site without written permission of BPS Security Division.
4. Guards and supervisors dismissed from duty must be replaced within four (4) hours of dismissal.

3.03 FIELD TESTING / QUALITY CONTROL

A. Recordkeeping

1. Contractor(s) shall maintain business records pursuant to Rules and Regulations of Title 19 NYCRR, Section 170.8, entitled Business Records for Private Investigator, Watch, Guard and Patrol Agencies. The personnel record for each employee assigned to work hereunder must contain the following and be available for review upon request by DEP.
2. Name and home address
3. Employment application
4. Date of birth
5. Unique employee identification number
6. Color photograph (from photo ID card)
7. Birth certificate
8. High school diploma or GED
9. NYS fingerprint card
10. Record of basic training as required by the NYS Security Guard Act of 1992; FDNY; etc.
11. Medical exam certificate
12. Clinical drug test results to include urine analysis

13. Results of annual drug screening
14. Results of background investigation
15. Color copy of a valid current armed security guard license issued by the State of New York (where applicable)
16. Color copy of a valid current security guard license issued by the State of New York
17. Color copy of a valid current New York State driver's license, or New York State Non-Driver ID Card for those security guards not operating a motor vehicle or who do not have a Driver License
18. Pursuant to the Title 19 NYCRR, Section 170.5, entitled "Principal Business Address," all Contractors shall maintain a principal place of business within New York State, which shall contain the employee and business records for any licensed activities conducted within New York State. A residence may not be considered as a principal business address.
19. The Contractor must provide above records to DEP Project Manager and DEP BPS Security Division upon request.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

ATTACHMENT

NYC DEP Bureau of Police & Security Contractor Site Security Guidelines Water Supply / Water & Sewer / Sewage Treatment Plant Sites (*June 13, 2024*)

New York City Environmental Protection
Bureau of Police & Security
Contractor Site Security Guidelines
Water Supply / Water & Sewer / Sewage Treatment Plant Sites

June 13, 2024

Overview

This document details security guidelines that are often in addition to the Security Scope of Work detailed in the contract. They are intended for DEP Project Manager, Construction Management, Resident Engineer, and Contractor Personnel who work primarily at Bureau of Water Supply (BWS), Bureau of Water and Sewer Operations (BWSO) sites connected with water supply infrastructure.

With this revision coverage of these guidelines has now been extended to the Bureau of Wastewater Treatment (BWT) fourteen (14) sewage treatment plants plus Manhattan Pumping Station aka 13th Street and Bronx/Manhattan Grit Chambers on a project-by-project basis.

Additional locations may fall under these guidelines at the discretion the Bureau of Police & Security (BPS) DC and/or their authorized representative(s). Site Security Guidelines are subject to adjustment based on changes in operations or increased threat levels.

Table of Contents

1.0 Contact Information ***(Page 2)***
2.0 After Contract is Awarded ***(Pages 3-5)***
3.0 Additional Responsibilities of SPOC (Security Point of Contact) ***(Pages 6-7)***
4.0 Requirements During Work ***(Page 8)***
5.0 General Site Access ***(Page 9)***
6.0 Other ***(Page 10)***
7.0 Temporary Access Form ***(Page 11-12)***
a. Day Workers, Prospective Bidders, & Visitors

1. DEP Bureau of Police & Security Contact Information

DEP Police Eastview Precinct
Phone: 1-914-593-7500 or 1-888-426-7433
Fax: 1-914-345-1840
Email: PoliceEastviewComm@dep.nyc.gov

DEP Police Detective Bureau - Clearance Questions Securityclearance@dep.nyc.gov

If Work Location West of Hudson
Phone: 1-607-363-9000
For ID Questions – ID_Cards_West@dep.nyc.gov

If Work Location East of Hudson/In-City
Phone: 1-914-593-7521 or 1-914-593-7500
Email: ID-Cards_East@dep.nyc.gov

Security Division / Security Engineering Unit
Security Manager, Jeremy Larsen, Phone: 1-914-749-5338

2. After Contract is Awarded

2.1. Prior to the start of work, the Contractor (Construction Management (CM) and the Prime Contractor where applicable) each must appoint a Security Point of Contact (SPOC) to liaise with DEP Police and Security Engineering Unit (SEU) on all security-related matters.

2.1.1. An alternate SPOC (ASPOC) must also be appointed by the Contractor (Prime Contractor and CM where applicable) in the event of SPOC absence or unavailability.

2.1.2. On contracts with multiple prime contractors, the G-Contractor will appoint the designated SPOC and ASPOC.

2.2. The SPOC/ASPOC responsibilities extend to all subcontractors, consultants, and sub-consultants of the Contractor (Prime Contractor and CM where applicable).

Required Notification of SPOC/ASPOC to DEP Police by DEP Project Manager

2.3. DEP Project Manager must make email notification to the DEP Detective Bureau (securityclearance@dep.nyc.gov) and appropriate DEP Police Precinct Command Center based on location (see Contact Information on Page 2) the following information:

2.3.1. Names and contact information of SPOC and ASPOC
2.3.2. Expected contract duration
2.3.3. Updates must be made of any changes
2.3.4. Subject line must include contract number and work location(s)

SPOC/ASPOC Training

2.4. All SPOCs/ASPOCs must receive SPOC Training given by BPS Security Manager and/or authorized representative(s) prior to site mobilization.

2.4.1. Trainees are expected to read, review, and be familiar with most up to date *NYC DEP BPS Contractor Site Security Guidelines* prior to training

2.4.2. Upon the completion of training, all trainees will sign an acknowledgement statement that they are familiar with and will comply with the guidelines

SPOC/ASPOC Responsibilities

2.5. All persons working under a DEP Contract or on DEP Property must pass a security clearance by the DEP Police Detective Bureau.

2.6. No less than 10 days prior to the commencement of work, SPOC must submit a Security Clearance Form (most up to date form available from DEP Project Manager) to SecurityClearance@dep.nyc.gov.

2.6.1. *On the email subject line, list the contract number and project location(s), ex. CAT 210E – Eastview UV*

2.7. Clearance Forms must either be typed or printed clearly and legibly.
2.7.1. *Incomplete or illegible forms will not be processed.*

2.8. Submissions to the Detective Bureau are to be from the SPOC, ASPOC, or the DEP Project Manager only. *Individual submissions will not be accepted.*
2.8.1. The DEP Project Manager must be copied on all transmissions
2.8.2. All forms should be saved as an attachment and saved as the employees name then emailed
2.8.3. Forms should be submitted as multiple attachments. Please do not send as a group attachment

2.9. The DEP Detective Bureau will have 5 to 10 days to complete the requests. The detectives will notify the SPOC and DEP Project Manager of all workers who have been cleared. SPOC/ASPOC or DEP Project Manager will contact DEP Detective Bureau to set up an appointment for the issuance of DEP Non-Employee Identification Cards. Contact information for appointments are in Security Clearance Information.
2.9.1. **Workers who are not cleared will not be permitted on DEP Property**
2.9.2. Any additional or replacement workers must be submitted for security clearance and issued DEP Non-Employee Identification Cards using the same procedures set forth above
2.9.3. Security Clearances are valid for one year from the date of clearance

2.10. Identification Cards must be visibly worn while on site or at any other DEP Facility.
2.10.1. Identification cards are valid for one year from the date of clearance
2.10.2. Renewal of ID cards must be coordinated with the Detective Bureau after passing a successful security re-clearance

Special Note on ID Cards:
2.10.3. ID Cards may only be used to access a location where the person has a "job-related" reason for being on site (*see also Section 5.1*)
2.10.4. **Lefrak**
2.10.4.1. Only consultants and contractors that work full time at Lefrak will be issued an ID card with access to this facility. All others will need to check in at the security desk and be issued a visitor's pass
2.10.4.2. For those meeting the criteria outlined in 2.10.4.1, please fill out and complete a DEP Non-Employee ID Card Issuance Form (available from BPS website). It must be signed by the respective Bureau Deputy Commissioner
2.10.5. **Identification Card Collection**

2.10.5.1. All expired identification cards and/or those belonging to personnel who no longer work at the site must be collected by SPOC and surrendered to DEP Detective Bureau. *This must be done even if ID Cards are not expired.*

2.10.5.2. When employees leave the job, SPOC must notify Detective Bureau without delay that employee is no longer on the job

2.10.5.3. ***If an employee poses a potential threat, notify the appropriate DEP Police Command Center by phone or in person without delay***

2.10.5.4. Names of those with outstanding ID Cards must be reported to the Detective Bureau

2.10.5.5. The SPOC will be responsible for ensuring compliance

2.11. A security kick-off meeting is mandatory prior to the commencement of work. The following must attend:

2.11.1. The Contractor SPOC & ASPOC

2.11.2. The DEP Project Manager

2.11.3. (The Resident Engineer where applicable)

2.11.4. A representative from the DEP Division responsible for the facility or contract location

2.11.5. The BPS Security Engineering Unit (SEU) Security Manager or his/her authorized representative

Security Systems and Security Requirements

2.12. The BPS SEU Director or his/her authorized representative(s) will be the responsible party for BPS in meetings and for approving security requirements

2.13. Security-Related Engineering Issues are to be addressed to the BPS SEU Director or his/her authorized representative(s)

2.14. DEP Project Manager and SPOC/ASPOC will be responsible for coordinating as early in advance as possible any issues regarding security systems with the BPS SEU Director or his/her authorized representative(s). This includes both existing security systems and security system installations/upgrades that are being done as part of the contract

2.15. Every security-related computer, server, or other network device must be reviewed and possibly configured with security settings by the BPS Security Engineering Unit (SEU). Contractor must provide machine access to SEU or work with the SEU security system administrator to implement the settings. Systems must be kept up to date with latest firmware and security patches.

3. Additional Responsibilities of SPOC/ASPOC:

3.1. SPOC/ASPOC will be responsible for ensuring compliance with all DEP Police and Security Directives and related facility policies by all contractor personnel. Non-compliance on the part of contractor personnel may result in denial of future access to the site, or a stop work order.

3.2. SPOC/ASPOC must submit the following project related information to DEP Police Eastview Precinct or by email prior to the first day of work. Submissions must include the following:

a. Contract Number and Project Name
b. Name and contact information of Security Point of Contact and emergency contact list
c. Work Schedule
d. List of personnel accessing the site and company (include Security Clearance Number)
e. List of all vehicles parked at site including make, color, model, license #, and registered owner (include Security Clearance Number)

3.3. SPOC/ASPOC should update list immediately to reflect any changes in personnel.

3.4. Provide to related security booths, DEP Project Manager, and DEP Police Eastview Precinct weekly lists of all personnel working at the site. List should remain current to reflect any changes to staff.

3.5. Keys – A list of all those who have keys to contractor entrance gates must be provided to DEP Project Manager and kept current to reflect any changes. The SPOC/ASPOC is responsible for collecting keys from all personnel who no longer work at the site.

3.6. Deliveries (other than UPS or Fed-Ex) - provide the following information, via email or fax to DEP Police Eastview Precinct (available on BPS website or from DEP Project Manager) as early in advance as possible.

3.6.1. Contractor (Prime Contractor where applicable) SPOC/ASPOC is responsible for escorting deliveries and coordinating with site security and DEP Police.

Special Note on Deliveries:

3.6.2. Driver of delivery vehicle must have valid driver license and vehicle registration must be in order to access the site.

3.6.3. All vehicles are subject to search upon entering and/or exiting DEP-controlled sites by DEP Police and/or onsite security.

3.6.4. DEP Police and/or site security reserve the right to deny access to or order removed any vehicle from DEP Property.

Security of Vehicles on Site

3.7. The SPOC/ASPOC is required to make sure that all vehicles related to contract work are secured during non-working hours. This includes, but is not limited to, removal of keys with secure storage and temporary disabling against malicious start up.

4. Requirements During Work:

4.1. Nothing contained herein shall diminish in any way the responsibility of any Contractor for safeguarding and protecting his own work, materials, tools and equipment.

4.2. All security measures must be completed to the satisfaction of BPS SEU prior to the start of work.

4.3. The contractor is required to report all suspicious, unusual, criminal or dangerous activities to DEP Police without delay to:

- Eastview Precinct at
  - 1-914-593-7500 or 1-888-426-7433

Notification to DEP Police must be made by phone. Email is not acceptable.

4.4. **Emergencies must be reported immediately to**:

- **911 and**
- Eastview Precinct at
  - 1-914-593-7500 or 1-888-426-7433
- Central number at location if site is at an existing facility.

4.5. If an unusual occurrence happens within the area of the site such as theft, vandalism, civil disturbance, larceny, riots or terrorism or any crime within the Penal Law of the State of New York, the contractor and / or its representatives agree to inform without delay all official authorities including DEP Police Eastview Precinct at 1-914-593-7500 or 1-888-426-7433 and to cooperate fully in any official investigation.

4.6. If an accident, spill, or unusual hazard occurs within the area of the site, the contractor and / or its representatives shall immediately inform DEP Police Eastview Precinct at 1-914-593-7500 or 1-888-426-7433 and all official authorities as required by law and to cooperate fully in any investigation.

4.7. The contractor, its representatives, and all subcontractors shall cooperate with the New York City Department of Investigation and the DEP Inspector General in all matters within their jurisdiction and in accordance with Mayoral Order 16/78.

5. General Site Access:

5.1. Governed by having a "job-related" reason to be there. Otherwise not permitted and considered unauthorized access except in a formally scheduled event such as a DEP hosted pre-bid site visit. (see also Section 2.10.3)

5.1.1. Violators face penalties including permanent denial of access to DEP Sites.

5.2. Parking will be outside of work perimeter except for vehicles essential to work.

5.2.1. At some designated sites vehicles used in operations must be registered with DEP Police using Vehicle Registration Forms (Available from DEP Project Manager)

5.2.1.1. SPOC/ASPOC may also create spreadsheet of vehicles containing the information requested on the form

5.2.1.2. Identification of sites requiring Vehicle Registration Forms will be made in contract documents or pre-project meeting

5.3. Keys - Distribution shall be limited:

5.3.1. *Entrances to DEP Facilities* – Will be opened and secured daily by DEP Project Manager or his/her authorized DEP Representative. Facility keys will not be given to Non-DEP Employees.

5.3.2. *Entrance Gates* – In certain cases as approved by DEP Police contractor lock may be put on gate. Distribution of keys to that lock is restricted to contractor supervisory personnel.

5.3.3. *Construction Gates (where applicable)* – Installed for the duration of construction. DEP Police must be provided with keys.

5.3.4. Contractor must provide DEP Project Manager and BPS SEU Security Manager with key control policy acceptable BPS SEU Security Manager and list of all personnel with keys to the entrance gate. List shall be updated to reflect changes in access authorizations.

5.4. Entrance Gates must remain closed and locked unless an authorized person and/or vehicle is entering or exiting the site.

5.5. Deliveries are to be screened through DEP Police Eastview (See Item 2.6 under "Additional Responsibilities of SPOC/ASPOC.")

6. Other:

6.1. No firearms are permitted on DEP Property even with legal permit.

6.1.1. No firearms are to be stored during working hours in vehicles belonging to those working at DEP Sites.

6.2. If work site is located on the property of an existing operating facility, contractor personnel must comply with current facility policies. This includes, but is not limited to the areas of security, health & safety, evacuations, participation in all drills, parking, and other requirements.

6.3. Press Inquiries / Requests for Information – Do not speak to any news/media/ or press person or any inquisitive citizen regarding any matter, including any matter of security pertaining to DEP: Instead:

6.3.1. Refer to DEP Press Office at (718) 595-7867

6.3.2. Notify DEP Police Eastview Precinct

6.4. No family or friends are permitted on any construction site without prior authorization from DEP Project Manager and have received a Temporary Clearance

7. Temporary Access Form - Day Workers, Prospective Bidders, & Visitors:
(Applies **only** to those who are **not** part of the regular CM and/or contractors staff)

7.1. Combined form that includes Day Workers, Prospective Bidders, and Day Tours.
- 7.1.1. Forms are available from DEP Project Manager or DEP contact
- 7.1.2. Directions for completion and submission are on form.
- 7.1.3. Submission of forms must come from DEP Project Manager, DEP Contact, or SPOC/ASPOC identified by DEP Project Manager or contact
- 7.1.4. *Individual submissions will not be accepted*
- 7.1.5. All submitted forms must include a copy of current government-issued photo identification of the day worker. Expired identification will not be accepted
- 7.1.6. Subject line must list contract number and work location(s)
- 7.1.7. Approval only applies to site(s) with job-related reason to be on
- 7.1.8. Copies of approved Temporary Access Forms must be kept by worker, SPOC/ASPOC, and security post where applicable

Day Workers Persons working at a facility or project site on a day to day basis and not part of the contractor or CM regular staff. An example would be someone sent from the Union Hall for a particular job

- Approved day workers must have current government issued photo identification while on site at all times
- Clearance is good for 15 days after which another Temporary Access Form must be submitted

Prospective Bidders - Required for pre-bid site visits and during visits of any potential contractors or sub-contractors while work is in progress

- Submission of forms must come from the DEP Project Manager of record only
- No forms received after two days before the scheduled pre-bid meeting and site visit will be accepted Subject line must list contract number and work location(s)
- Prospective bidders must bring current government-issued photo identification to meeting and site visit and follow all site rules. Videotaping and interior photography are prohibited of water supply assets
- Clearances for prospective bidders are valid for the day of the meeting and site visit only

Visitors - Not permitted on DEP sites without prior permission from the Commissioner or his/her appointed designee.

- Submission of forms must come from the DEP Project Manager of record
- Subject line must list contract number and work location(s)
- Visitors must bring current government-issued photo identification to meeting and site visit and follow all site rules

- Videotaping and interior photography are prohibited of water supply assets
- Clearances for visitors are valid for the day of the visit only

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the sustainability requirements of this Project.

B. The intent is for sustainability goals to be achieved in a manner that ultimately provides a safe and healthy environment for building occupants and community members with minimal negative impact on the local, regional and global environment.

1. Third party sustainability verification will not be pursued for this Project. The Institute for Sustainable Infrastructure's (ISI) Envision Rating System will be used as a guiding framework for achieving the sustainability goals identified for this Project.

C. Attachments

1. Attachment A: Sustainability Construction Documentation

2. Attachment B: Environmental Materials Reporting Form

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Application	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 35 27 – Environmental Health and Safety Requirements

C. Section 01 74 20 – Construction Waste Management

1.04 REFERENCES

A. ISI's Envision Version 3 (V3) as released on April 17, 2018, is the Envision framework used and referenced herein.

1.05 DESCRIPTION

A. General

1. The Contractor shall comply with sustainability requirements as indicated in this Section, other Specifications and Contract Drawings. The Contractor shall meet all sustainability requirements as stipulated in Attachment A through the New Material Sustainable Implementation Plan and the Sustainability Construction Documentation.

2. The Contract Documents are not intended to limit alternative means of achieving sustainability requirements. Suggestions from the construction team during Project meetings for implementing sustainability goals are encouraged.

3. All new materials shall be procured in accordance with the Environmentally Preferred Purchasing guidelines per Local Laws 118-121 of 2005.

1.06 QUALITY ASSURANCE

A. The Contractor shall designate a Sustainability Coordinator on staff who shall be responsible for sustainability compliance and coordination.

1. The Sustainability Coordinator shall preferably be an Envision Sustainability Professional (ENV SP). The Sustainability Coordinator shall be responsible for sustainability considerations described in this section, including the New Materials Sustainable Implementation Plan and the Sustainability Construction Documentation.

1.07 SUBMITTALS

A. New Materials Sustainable Implementation Plan

1. The Contractor shall develop and implement the New Materials Sustainable Implementation Plan for the Project, where new materials refer to any item, supply, equipment, or other physical object being newly purchased for the single-use or long-term use for the duration of the Project.
2. The New Materials Sustainable Implementation Plan shall provide a method for how the Contractor plans to meet the requirements stipulated in Attachment A for recycled material, regional material, and sustainably sourced content.
3. The Contractor shall prepare and submit the New Materials Sustainable Implementation Plan for review and approval by the Engineer thirty (30) days after receipt of Notice to Proceed and prior to the selection of any new materials.
4. The Contractor shall use the Sustainable Material Content Plan (SMCP) as reference for the development of the New Materials Sustainable Implementation Plan. The SMCP is generated by the Engineer and included in the bid exhibit documents. The SMCP is expressly excluded from and is not a part of this Contract and is available for information purposes only.
5. The following equations shall be used to calculate values to input in the Environmental Materials Reporting Form (EMRF) (Attachment B):

a. Equation 1: Percent Recycled Content

$$Percent\ Recycled\ Content = \frac{Estimated\ Material\ Weight\ from\ Recycled\ Source}{Estimated\ Total\ Material\ Weight} \times 100$$

b. Equation 2: Overall Percent Recycled Content

$$Overall\ Percent\ Recycled\ Content = \frac{Estimated\ \ Total\ Material\ Weight\ from\ Recycled\ Sources}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

c. Equation 3: Percent Regional Content

$$Percent\ Regional\ Content = \frac{Estimated\ Material\ Weight\ Sourced\ Regionally}{Estimated\ Total\ Material\ Weight} \times 100$$

d. Equation 4: Overall Percent Regional Content

$$Overall\ Percent\ Regional\ Content = \frac{Estimated\ Total\ Material\ Weight\ Sourced\ Regionally}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

e. Equation 5: Percent Sustainably Sourced Content

$$Percent\ Sustainably\ Sourced\ Content = \frac{Estimated\ Material\ Weight\ Sustainably\ Sourced}{Estimated\ Total\ Material\ Weight} \times 100$$

f. Equation 6: Overall Percent Sustainably Sourced Content

$$Overall\ Percent\ Sustainably\ Sourced = \frac{Estimated\ Total\ Material\ Weight\ Sustainably\ Sourced}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

6. The New Materials Sustainable Implementation Plan shall include estimates of recycled material content, regional material content, and sustainably sourced content as described:

   a. Recycled material content estimate:

      1) Identify the percentage of recycled content of at least five (5) materials which will meet the recycled content requirements as stipulated in Attachment A.

      2) The total recycled material shall be estimated by including the total proposed weight in tons of all new materials and supplies procured for the Work, excluding mechanical equipment, electrical equipment, and plumbing equipment and their components, and excluding plants, soils, rocks, and water.

      3) The estimated recycled content shall be calculated in tons per Attachment B – EMRF.

   b. Regional material content estimate:

      1) Identify the percentage of regional content of at least five (5) materials which will meet the regional content requirements as stipulated in Attachment A.

      2) Regional content shall be defined per material by a distance of the supplier from the Site requirement in radii as the crow flies from the Project Site, as listed in Table 1.

Table 1: Regional Content Requirements

Material	Distance from the Site Requirement
Soils and mulches	50 miles
Aggregates, Sands	50 miles
Concrete	100 miles
Plants	250 miles
Other materials (excluding equipment)	500 miles
Mechanical, electrical, plumbing	N/A

      3) The total regional material content shall be estimated by including the total proposed weight in tons of all new materials and supplies procured for the Work, excluding mechanical equipment, electrical equipment, and plumbing equipment and their components.

4) The estimated regional content shall be calculated in tons per Attachment B - EMRF.

c. Sustainably sourced content estimate:

1) Identify the percentage of sustainably sourced content of at least five (5) materials which will meet the sustainably sourced content requirements as stipulated in Attachment A.

2) Sustainably sourced content shall be defined as procuring materials, supplies, and equipment from a manufacturer that is demonstrably protective of human health and the environment. Demonstrably protective may include third party sustainability certification programs, environmental product declarations, or corporate sustainability policies. Examples of qualifying requirements include but are not limited to:

a) Environmental management systems consistent with ISO (International Organization for Standardization) 14001

b) Product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

c) Third-party verified sustainability program (e.g., Forest Stewardship Council (FSC), Green Seal, EcoLogo, Underwriters Laboratory, National Biosolids Partnership (NBP), Concrete Sustainability Council (CSC), etc.)

d) Third-party verified corporate sustainability report consistent with the Global Reporting Initiative (GRI) Sustainability Report or equivalent.

3) The total sustainably sourced material shall be estimated by including the total proposed weight in tons of all new materials, supplies, and equipment procured for the Work.

4) The estimated sustainably sourced content shall be calculated in tons per Attachment B - EMRF.

7. The New Materials Sustainable Implementation Plan shall include a section for material vendors and supporting documentation that demonstrates the expected recycled, regional, and sustainably sourced content.

B. Sustainability Construction Documentation

1. The Sustainability Coordinator shall be responsible for preparing and submitting the Sustainability Construction Documentation. The Sustainability Construction Documentation will be submitted to the Engineer on a monthly basis following Notice to Proceed. At Project closeout, the Sustainability Construction Documentation shall be completed and submitted to the Engineer.

2. The Sustainability Construction Documentation shall include the following items:

    a. A cover sheet that describes updates since the last submission, how the new materials reporting documentation differs from the New Materials Sustainable Implementation Plan, and a projection of how the Project is projected to meet the requirements stipulated in Attachment A.

        1) The Contractor shall make a good faith effort to meet the targets stipulated in Attachment A.

    b. The EMRF (Attachment B) and supplementary articles including shop drawings, specifications and receipts/invoices for materials containing recycled, regional, and/or sustainably sourced content. The Contractor shall work with the vendor to obtain the supplementary articles. The Contractor shall save such original documents for the life of the Project plus two (2) year(s). The specifications shall include the following, as applicable:

        a) Name of the product

        b) Name of the manufacturer

        c) Weight of the material

        d) Percentage of recycled content (either post-industrial or post-consumer recycled content)

        e) Location of the manufacturer

        f) Manufacturer’s sustainable qualifying documentation

    c. Construction waste information shall be collected per requirements described in Section 01 74 20 – Construction Waste Management.

    d. Local Law 77: DEP Monthly Report Form 1, as described and included as Attachment A in Section 01 14 00 – Work Restrictions.

    e. Local Law 77: DEP Monthly Report Form 2, as described and included as Attachment A in Section 01 14 00 – Work Restrictions.

    f. The status of the Sustainability Construction Documentation items shall be updated in each submittal.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not used.

1.10 WARRANTY

A. Not used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not used.

2.02 MATERIALS / EQUIPMENT

A. Not used.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not used.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not used.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not used.

3.02 APPLICATION

A. Not used.

3.03 FIELD TESTING / QUALITY CONTROL

A. Sustainability Coordinator duties:

1. The Sustainability Coordinator shall attend a minimum of three (3) on-site coordination meetings. The Sustainability Coordinator shall make available for review at each meeting a set of Contract Drawings and Specifications, the New Materials Sustainable Implementation Plan and the updated Sustainability Construction Documentation.

    a. The first meeting will be a preconstruction meeting to review the New Materials Sustainable Implementation Plan and establish roles including the Sustainability Coordinator and the Engineer.

    b. The second meeting will be a pre-closeout meeting to review the Sustainability Construction Documentation for completeness and

identify any outstanding issues relating to requirements stipulated in Attachment A.

c. The third meeting will be a closeout meeting to review the completed Sustainability Construction Documentation.

3.04 STARTUP / DEMONSTRATION

A. Not used.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

END OF SECTION

Attachment A
Sustainability Construction Documentation

Indicator	Minimum Required Level[1]	Envision Credit Reference for Calculation Guidance[6]	Reporting Template
Recycled Material	8%[2]	RA1.2	Attachment B
Regional Material	93%[3]	-	Attachment B
Sustainable Procurement	100%[4]	RA1.1	Attachment B
Waste Reduction	99%[5]	RA1.4	Section 01 74 20 – Construction Waste Management, and Section 01 35 27 – Environmental Health and Safety Requirements

1. Minimum required level was established based on project-specific goals.
2. Based on all new materials or supplies, procured during the Work, excluding mechanical, electrical, and plumbing equipment and their components, and excluding plants, soils, rocks, and water. All materials procured for the project shall be tracked in Attachment B – Environmental Materials Reporting Form (EMRF) to meet the project-wide goal for recycled content.
3. Based on all new materials or supplies, procured during the Work, excluding mechanical, electrical, and plumbing equipment.
4. Based on all new materials, supplies, equipment, or anything procured during the Work.
5. Total material streams contributing to Project diversion goal must be recycled, reused, and/or salvaged.
6. Envision v3 reference credits identified herein are noted for calculation guidance only.

Attachment B
Environmental Materials Reporting Form (EMRF)

Material	Type/ Product	**Recycled Content**			**Regional Content**				**Sustainably Sourced Content**				
		Total weight (tons)[1]	Total Recycled Material Content (%)[2]	**Total Recycled Content (tons)**	Total weight (tons)[3]	Source of material (miles from project site)	Total Regional Material Content (%)[4]	**Total Regional Content (tons)**	Total weight (tons)	Manufacturer/ Supplier Certifications[5]	Certificate Obtained? (yes/no)	Total Sustainably Sourced Content (%)[6]	**Total Sustainably Sourced Content (tons)**
Total			-			-	-			-	-	-	
Percentage of Recycled, Regional, or Sustainably Sourced Content by weight[7]													

1. Total weight of material for recycled content shall not include landscaping material such as planting soil, mulch or sodding, and mechanical, electrical, and plumbing equipment, as stipulated in Article 1.07.A.6.a.2
2. Per Article 1.07.A.5.a Equation 1
3. Total weight of material for regional content estimates shall not include mechanical, electrical, and plumbing equipment, as stipulated in Article 1.07.A.6.b.3
4. Per Article 1.07.A.5.c, Equation 3 and Article 1.07.A.6.b Table 1: Regional Content Requirements
5. May include third party sustainability certification programs, environmental product declarations, or corporate sustainabilty policies; option to include “no certification” if the manufacturer / supplier is not demonstrably protective of human health and the environment
6. Count as sustainably procured content if “yes” cerification has been obtained; Per Article 1.07.A.5.e, Equation 5
7. Per Article 1.07.A.5.b-e, Equation 2 (recycled), Equation 4 (regional), and Equation 6 (sustainably sourced); final percentages shall be greater than or equal to the Minimum Percentage by weight as provided in Attachment A

SECTION 01 41 00 – REGULATORY REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Inspection by City, State and Federal Government

B. Permits, Licenses, Work Approvals and Certificates

C. Electrical Inspections, Department of Buildings

D. Existing Utilities

E. Existing Flows

F. Diversion of Water

G. Disposal of Water

H. Conformance to Industrial Code

I. Conformance to Other Codes and Standards

J. The following index of this Section is presented for convenience:

K.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 57 00 – Temporary Controls

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Inspection by the City, State and Federal Government

1. The Contractor shall provide proper facilities for access to and inspection of the Work at all times for authorized representatives of the local, City, State and federal governments, the latter two in the presence of the Engineer.

B. Permits, Licenses, Work Approvals and Certificates

1. Unless otherwise specified in this Section, the Contractor shall obtain, pay for and comply with all necessary permits, licenses, approvals, certificates of inspection, and controlled inspection reports, and shall give all notices and pay all legal fees to local, City, State and federal departments having jurisdiction in connection with the Work of this Contract.

2. DEP has initiated applications for some permits. The Contractor shall be responsible for following up on and updating these permit applications, as needed, and for initiating and obtaining all other required permits necessary for the performance of this Contract, for renewing permits before they expire, and for maintaining these permits by paying for them regularly and complying with their requirements during the period of performance of the Work.

a. Permits to be initiated and acquired for construction include but are not limited to the following:

1) FEMA - Elevation Certificate (at end of construction phase)

2) USEPA - Remedial Action Plans

3) USEPA-Spill Prevention, Control and Countermeasure Plan

4) NYSDEC - Protection of Waters Permit Dams and Impoundment Structures (Construct, Reconstruct, or Repair)

5) NYSDEC - Protection of Waters Permit 401 Water Quality Certification

6) NYSDEC - Freshwater Wetlands Permit

7) NYSDEC - State Pollution Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities (GP-0-15-002)

8) NYSDEC - Stormwater Pollution Prevention Plan for Stormwater Discharges

9) NYSDEC - Beneficial Use Determination

10) NYSDEC - Waste Transporter Permit

11) NYSDEC - Hazardous Substance Bulk Storage Registration (Chemical Bulk Storage Registration)

12) NYSDEC - United States Environmental Protection Agency (USEPA) Identification Number

13) NYSDEC - Waste Transporter Permit

14) NYSDEC - Petroleum Bulk Storage Facility Registration

15) NYSDOT - Divisible Load Overweight Permits (Form PERM 92)

16) NYSDEC - Minor Facility Registration: Permit to Construct

17) New York Natural Heritage Program Consultation

18) NYSOPRHP- Section 106 Consultation

19) United States Army Corps of Engineers – Nationwide Permit 43-Stormwater Management Facilities

20) United States Army Corps of Engineers – Nationwide Permit 5-Scientific Measurement Devices

21) United States Army Corps of Engineers – Nationwide Permit 7-Outfall Structures and Associated Intake Structures

22) USFWS - Formal Consultation (Jeopardy/No Jeopardy Determination

23) NYCPDC Conceptual, Preliminary, and Final Approval

24) NYCDEP - City Environmental Quality Review Environmental Assessment Statement

25) NYCDEP - Stormwater Pollution Prevention Plan Approval

26) NYCDEP - Regulatory Compliance Transition Plans

27) NYSDOH - Approval of Plans for Public Water Supply Improvement

28) NYCDEP - Air Pollution - Work Permit

29) NYCDEP - Approval of Backflow Prevention Devices (Form GEN 236) and Backflow Prevention Test and Maintenance Report

30) NYCDEP - Internal Combustion Fuel Burning Equipment Registration (Form AR 504)

b. Other permits to be acquired for construction phase activities include but not limited to the following:

1) NYSDOT - Divisible Load Overweight Permit, Restricted Vehicle Permit

2) NYSDOT - Special Hauling Permit (Form PERM 39-1 or PERM 39-2)

3) DSNY - Certification of Load Data

4) FDNY - Hazardous Chemicals

5) NYCDEP - Permit to Install Manhole

6) NYCDEP - Trailer Connection Permit

7) NYCDEP - Not an Asbestos Project Notification (Form ACP5)

8) Ulster County - Hazardous/Chemical/Flammable Liquid Storage Permit

3. All Work performed under the Contract shall conform to the applicable codes and standards of the National Electrical code (NFPA 70), the Building Code of New York State and all other local, State and Federal government Departments having jurisdiction.

4. Upon completion of the various stages of construction, the Contractor shall schedule inspections and obtain certificates of approval and/or acceptance from the various agencies and departments having jurisdiction and shall deliver these certificates to the Engineer.

C. Electrical Inspections, Department of Buildings

1. The Contractor, as mandated by law, shall make application for a certificate of electrical inspection to the local Authority having Jurisdiction (AHJ) for electrical Work furnished under this Contract. Proof of filing for the certificate shall be submitted to the Engineer in the form of notification email issued by the DOB at the time of application. Such proof shall be submitted within fifteen (15) days after the date upon which the Contractor is notified by the City to commence Work.
2. After completion of the Work, the Contractor shall notify the local AHJ, requesting that a final inspection be made.
3. Prior to final Substantial Completion, the Contractor shall provide evidence to the Engineer that a Certificate of Inspection, which is signed by the Local AHJ and certifies that:
    a. All materials and workmanship comply in every respect with the codes and standards of the National Electric Code, the Building Code of New York State, or Local AHJ.
    b. All materials and workmanship comply in every respect with the Contract Documents approved by the Local AHJ and fulfill the intent thereof.

D. Existing Utilities

1. All subsurface utility and structure information shown on the Contract Drawings were obtained from various plans, maps and field investigations; however, they are not guaranteed to be complete or accurate. It shall be the Contractor's responsibility to locate all such necessary utilities or structures by using field investigation methods acceptable to the Engineer prior to the start of construction. No separate payment will be made for field investigations.
2. During the progress of the Work, the Contractor shall protect from damage any existing utilities or services within the Work areas until, they have been re-routed, disconnected or capped off.

E. Existing Flows

1. The Contractor shall, as approved by the Engineer, provide and construct flumes, temporary sewers, dams and all incidental and related facilities necessary to divert or otherwise take care of groundwater and surface drainage, and to prevent any sediments from being conveyed into the existing storm sewer inlets, combined sewer inlets or watercourses.

F. Diversion of Water

1. The Contractor shall, as approved by the Engineer, provide and construct flumes, temporary sewers, dams and all incidental and related facilities necessary to divert or otherwise take care of groundwater and surface drainage, and to prevent any sediment from being conveyed into the existing

storm sewer inlets or watercourses. All such structures, methods, and practices shall be in accordance with the existing stormwater pollution prevention plans (SWPPPs) at the site(s) of the Work and with the permits (e.g., NYSDEC) obtained for the site(s) and regulations governing such activity.

G. Disposal of Water

1. Water from open cut and/or sheeted excavations, manholes, structures, trenches, or from whatever source, shall be disposed of in accordance with regulations of authorities having jurisdiction, permits and methods approved by the Engineer. All such structures, methods, and practices shall be in accordance with the existing SWPPPs at the site(s) of Work and with permits (e.g., NYSDEC) obtained for the site(s) and regulations governing such activity.

H. Conformance to Industrial Code

1. The Contractor's attention is directed to requirements of the Industrial Code of the State of New York, Department of Labor, Board of Standard and Appeals, latest edition and amendments or supplements thereto (the Code). New York State Industrial Code rules applicable to the Work include, but are not limited to, the following:

a. Rule No. 2: Exit enclosures, vertical opening and floors in factory buildings.

b. Rule No. 8: Construction, guarding, equipment, maintenance and operation of elevators, dumbwaiter, escalators, hoists and hoistways in factories, and mercantile establishments.

c. Rule No. 16: Floor and stair surfaces, railings and toeboards.

d. Rule No. 19: Guarding of dangerous machinery, vats and pans.

I. Conformance to Other Codes and Standards

1. All devices, materials and installations shall conform to the current latest edition of the applicable requirements of the New York City Administrative Code, the National Electrical Code (NFPA 70), ANSI, ASTM, IEEE, NEMA, OSHA, UL and the Contract Documents and the documents specified elsewhere in the specifications. In the event of a conflict between any codes or laws of the City of New York and any other applicable code or standard, the City of New York codes and laws shall take precedence.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Abbreviations and Acronyms
2. Definitions
3. Reference Standards

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Installation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	3
3.05	Adjusting / Protection / Cleanup	3

C. The following tables, located after the "End of Section" designation, are a part of this Section:

1. Table 01 42 00-1 – List of Abbreviations
2. Table 01 42 00-2 – List of Acronyms
3. Table 01 42 00-3 – Standards Developing / Publishing Organizations

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. References applicable to all Specification Sections are listed in Tables 01 42 00-1 through -3, located after the "End of Section" designation.

B. Use of the abbreviations or acronyms in Tables 01 42 00-1 through -3 is optional.

1. Reference to a technical society, organization, body, or code may be made in the Specifications by using the acronyms listed in Table 01 42 00-3 or by using the full organization name.

2. Not all abbreviations, organizations or reference standards listed in Tables 01 42 00-1 through -3 are necessarily utilized in the Contract Documents.

C. Use of Reference Standards:

1. All Work shall comply with the standards referenced, except as follows:

a. Where more stringent requirements are shown or specified, and/or

b. Where more stringent requirements are required by Law.

2. Referenced standards shall be current as of the time of bidding the Contract Documents, unless otherwise specified.

3. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization, or body, the reference shall be construed to mean the latest standard, code, specifications or tentative specification adopted and published, unless otherwise specified by the Engineer.

4. When no reference is made to a code, standard or specification, the standards of the ASTM or the IEEE shall govern.

5. Where an item of equipment is specified to be explosion- proof, it shall be so certified by an independent agency recognized by the insurance industry, namely, UL, FM, etc. In all cases, materials shall be of the quality and character which, in the opinion of the Engineer, are best suited for the purpose for which they are required.

6. The Contractor shall obtain copies of the referenced standards when required by the Contract Documents.

D. Additional references and definitions may be defined in individual Sections, and these additional references and definitions shall be applicable only to the Work specified under those Sections.

1.06 QUALITY ASSURANCE

A. To ensure proper use of reference standards in the preparation of Shop Drawings, the Contractor shall employ qualified personnel with at least five (5) years' construction project experience including the use of industry standards and compliance with construction codes and regulations.

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

TABLE 01 42 00-1
LIST OFABBREVIATIONS

alternating current	a-c
ampere	A
antemeridian	a.m.
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
average	avg
biochemical oxygen demand	BOD
five-day biochemical oxygen demand	BOD_5
brake horsepower	bhp
British thermal unit	Btu
building information model	BIM
carbonaceous biochemical oxygen demand	CBOD
five-day carbonaceous biochemical oxygen demand	$CBOD_5$
chemical oxygen demand	COD
Centigrade (or Celsius)	C
chlorinated polyvinyl chloride	CPVC
chlorofluorocarbons	CFC
Code of Federal Regulations	CFR
computer-aided drafting and design	CADD, or CAD
consecutive calendar day(s)	ccd
cubic inch	cu in
cubic foot	cu ft
cubic yard	cu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs
day(s)	d
decibel	db
degree Centigrade (or Celsius)	degrees C, ºC, or deg C
degrees Fahrenheit	degrees F, ºF, or deg F
diameter	dia
direct current	d-c
dollars	$
each	ea
efficiency	eff
Fahrenheit	F
feet	ft
feet per hour	fph, or ft/hr
feet per minute	fpm
feet per second	fps, or ft/sec

TABLE 01 42 00-1
LIST OFABBREVIATIONS
(Continued)

figure	fig
flange	flg
foot-pound	ft-lb
gallon	gal
gallons per hour	gph, or gal/hr
gallons per minute	gpm or gal/min
gallons per second	gps or gal/sec
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
hour	hr
human-machine interface	HMI
inch	in.
inches of mercury	in. Hg
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
kilowatt	kw
kilowatt-hour	kwhr or kwh
linear foot	lin ft or LF
liter	L
Leadership in Energy and Environmental Design (USGBC)	LEED
maximum	max
mercury	Hg
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallon	MG
minimum	min
national pipe thread	NPT
net positive suction head	NPSH

TABLE 01 42 00-1
LIST OFABBREVIATIONS
(Continued)

net positive suction head available	NPSHA
net positive suction head required	NPSHR
nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) plus nitrogen dioxide (NO_2)	NOx
nominal pipe size	NPS
number	no.
operator interface terminal	OIT
ounce	oz
ounce-force	ozf
outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig
pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
second	sec
specific gravity	sp gr, or SG
square	sq
square foot	sq ft, sf, or ft^2
square inch	sq in., or in^2
square yard	sq yd, or SY
standard	std
standard cubic feet per minute	scfm
thousandth of an inch	mil
total dynamic head	TDH
totally-enclosed fan-cooled	TEFC
volt	V
volts alternating current	vac
volts direct current	vdc
volatile organic compounds	VOC

TABLE 01 42 00-2
LIST OFACRONYMS

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ABS	American Bureau of Shipping
ACI	American Concrete Institute
ACRI	Air Conditioning and Refrigeration Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHDGA	American Hot Dip Galvanizers Association
AISC	American Institute of Steel Construction
AISE	Association of Iron and Steel Engineers
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM Des.	American Society for Testing and Materials Designation
AWS	American Welding Society
AWWA	American Water Works Association
BEC	Bureau of Electrical Control
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
DEMA	Diesel Engineer Manufacturers Association
DIPRA	Ductile Iron Pipe Research Association
DOD	Department of Defense
FED Spec.	Federal Specification
FM	Factory Mutual
IEEE	Institute of Electrical & Electronics Engineers
IPCEA	Insulated Power Cable Engineer's Association
ISO	International Organization for Standardization
JV	Gannett Fleming / Hazen and Sawyer Joint Venture
MIL -Spec	Military Specification (Department of Defense)
MTA	Metropolitan Transportation Association
NAVY Spec.	Navy Department Specification
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NIST	National Institute of Standards and Technology
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
NYCBC	New York City Building Code
NYSBC	New York State Building Code
NYSDOT	New York State Department of Transportation

TABLE 01 42 00-2
LIST OFACRONYMS
(Continued)

OSHA	Occupational Safety & Health Administration (U.S. Department of Labor)
PANYNJ	Port Authority of New York and New Jersey
PPS	Power Piping Society
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
UL	Underwriters Laboratories, Inc.
UNS	Unified Numbering System of Alloys
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	Unites States Environmental Protection Agency

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS

AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE (AHRI) 2111 Wilson Blvd. Suite 500 Arlington, VA 22201 Phone: 703-524-8800 Fax: 703-562-1942 ahrinet.org	THE ALUMINUM ASSOCIATION (AA) 1400 Crystal Dr. Arlington, VA 22202 Phone: 703-358-2960 aluminum.org
AMERICANHORT 2130 Stella Ct. Columbus, OH 43215 Phone: 614-487-1117 americanhort.org	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) 444 North Captial St., NW Suite 249 Washington, DC 20001 Phone: 202-624-5800 transportation.org
AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA) 330 N. Wabash Ave. Suite 2000 Chicago, IL 60611 Phone: 202-367-1155 americanbearings.org	AMERICAN BUREAU OF SHIPPING (ABS) ABS World Headquarters ABS Plaza 16855 Northchase Dr. Houston, TX 77060 Phone: 281-877-6000 Fax: 281-877-4976 eagle.org
AMERICAN CONCRETE INSTITUTE (ACI) 38800 Country Club Dr. Farmington Hills, MI 48331-3439 Phone: 248-848-3700 Fax: 248-848-3701 concrete.org	AMERICAN CONCRETE PIPE ASSOCIATION (ACPA) 8445 Freeport Pkwy. Suite 350 Irving, TX 75063 Phone: 972-506-7216 Fax: 972-506-7682 concretepipe.org
AMERICAN GALVALNIZERS ASSOCIATION (AGA) 6881 South Holly Cir. Suite 108 Centennial, CO 80112 Phone: 720-554-0900 Fax: 720-554-0909 galvanizeit.org	AMERICAN GAS ASSOCIATION (AGA) 400 North Capitol St., NW Suite 450 Washington, DC 20001 Phone 202-824-7000 aga.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA) 1001 N. Fairfax St. Suite 500 Alexandria, VA 22314-1587 Phone: 703-684-0211 Fax: 703-684-0242 agma.org	AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) 130 East Randolph St. Suite 2000 Chicago, IL 60601-2001 Phone: 866-275-2472 aisc.org
AMERICAN IRON AND STEEL INSTITUTE (AISI) 25 Massachusetts Ave., NW Suite 800 Washington, DC 2001 Phone 202-452-7100 steel.org	AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) 1899 L St., NW 11th Floor Washington, DC 20036 Phone: 202-293-8020 Fax: 202-293-9287 ansi.org
AMERICAN PETROLEUM INSTITUTE (API) 1220 L St., NW Washington, DC 20005-4070 Phone: 202-682-8000 api.org	AMERICAN SOCIETY OF HEATING, REFRIGERATING and AIR-CONDITIONING ENGINEERS (ASHRAE) 1791 Tullie Cir., NE Atlanta, GA 30329 Phone: 404-636-8400, 800-527-4723 Fax: 404-321-5478 ashrae.org
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) 2 Park Ave. New York, NY 10016-5990 Phone: 800-843-2763 asme.org	AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) 18927 Hickory Creek Dr., Suite 220 Mokena, IL 60448 Phone: 708-995-3019 Fax: 708-479-6139 asse-plumbing.org
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) P.O. Box C700 West Conshohocken, PA 19428-2959 Phone: 610-832-9500 Fax: 610-832-9555 astm.org	AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 1801 Alexander Bell Dr. Reston, VA 20190 Phone: 800-548-2723 asce.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

AMERICAN WATER WORKS ASSOCIATION (AWWA) 6666 W. Quincy Ave. Denver, CO 80235 Phone: 303-794-7711, 800-926-7337 Fax: 303-347-0804 awwa.org	AMERICAN WELDING SOCIETY (AWS) 8669 NW 36 St. # 130 Miami, FL 33166-6672 Phone: 305-443-9353, 800-443-9353 awsnow.org
AMERICAN WOOD PROTECTION ASSOCIATION (AWPA) P.O. Box 361784 Birmingham, AL 35236-1784 Phone: 205-733-4077 Fax: 205-733-4075 Secure Fax: 205-733-4078 awpa.com	ASPHALT INSTITUTE (AI) 2696 Research Park Dr. Lexington, KY 40511-8480 Phone: 859-288-4960 Fax: 859-288-4999 asphaltinstitute.org
ASSOCIATION FOR IRON AND STEEL TECHNOLOGY (AIST) 186 Thorn Hill Rd. Warrendale, PA 15086-7528 Phone: 724-814-3000 Fax: 724-814-3001 aist.org	NEW YORK CITY DEPARTMENT OF BUILDINGS BUREAU OF ELCTRICAL CONTROL (BEC) 1 Centre Street Room 2324 New York, NY 10007 Phone 212-669-8338 buildingviolation.com/newyork.html
NEW YORK CITY BOARD OF STANDARDS AND APPEALS (BSA) 250 Broadway 29th Floor New York, NY 10007 Phone: 212-386-0009 www1.nyc.gov/site/bsa/index.page	THE BRICK INDUSTRY ASSOCIATION (BIA) 12007 Sunrise Valley Dr. Suite 430 Reston, VA 20191 Phone: 703-620-0010 gobrick.com
CALIFORNIA REDWOOD ASSOCIATION (CRA) 347 Healdsburg Ave. Suite L Healdsburg, CA 95448 calredwood.org	CAST IRON SOIL PIPE INSTITUTE (CISPI) 2401 Fieldcrest Dr. Mundelein, IL 60060 Phone: 224-864-2910 cispi.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

THE CHLORINE INSTITUTE (CI) 1300 Wilson Blvd. Suite 525 Arlington, VA 22209 Phone: 703-894-4140 Fax: 709-894-4130 chlorineinstitute.org	CODE OF FEDERAL REGULATIONS (CFR) U.S. Government Publishing Office 732 N. Capitol St., NW Washington, DC 20401-0001 Phone: 202-512-1800, 866-512-1800 Fax: 202-512-210 ecfr.gov/cgi-bin/ECFR
COMPRESSED GAS ASSOCIATION (CGA) 14501 George Carter Way Suite 103 Chantilly, VA 20151 Phone: 703-788-2700 Fax: 703-961-1831 cganet.com	CONCRETE REINFORCING STEEL INSTITUTE (CRSI) 933 North Plum Grove Rd. Schaumburg, IL 60173-4758 Phone: 847-517-1200 Fax: 847-517-1206 crsi.org
CONVEYOR EQUIPMENT MANUFACTURERS ASSOIATION (CEMA) 5672 Strand Ct. Suite 2 Naples, FL 34110 Phone: 239514-3441 cemanet.org	U.S. ARMY CORPS OF ENGINEERS (USACE) Engineer Research and Development Center (Formerly Waterways Experiment Station) 3909 Halls Ferry Rd. Vicksburg, MS 39180-6199 Phone: 601-634-2355 erdc.usace.army.mil/Library/
DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) P.O. Box 19206 Golden, CO 80402 Phone: 205-402-8700 dipra.org	FM APPROVALS 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062 Phone: 781-762-4300 Fax: 781-762-9375 fmapprovals.com
GENERAL SSERVICES ADMINISTRATION FEDERAL SPECIFICATIONS (FS) 1800 F St., NW Washington, DC 20405-0001 Phone: 703-605-2566 Fax: 202-219-3004 fedspecs.gsa.gov/FedSpecs_Federal_Specifications_page	HYDRAULIC INSTITUTE (HI) 6 Campus Dr. Floor 1 North Parsippany, NJ 07054 Phone: 973-267-9700 Fax: 973-267-9055 pumps.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

ILLUMINATING ENGINEERING SOCIETY (IES) 120 Wall St. 17th Floor New York, NY 10005-4001 Phone: 212-248-5000 Fax: 212-248-5017 ies.org	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) Phone: 800-701-4333 ieee.org
MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS) 127 Park St., NE Vienna, VA 22180-4602 Phone: 703-281-6613 msshq.org	METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA) 1300 Sumner Ave. Cleveland, OH 44115-2851 Phone: 216-241-7333 Fax: 216-241-0105 mbma.com
Materials and Equipment Acceptance (MEA) Division, New York City Department of Buildings 280 Broadway 7th Floor New York, NY 10007 Phone: 212-566-5000 www.nyc.gov	MILITARY SPECIFICATIONS (MIL-SPECs) DLA Document Services, Building 4/D 700 Robbins Ave. Philadelphia, PA 19111-5094 Phone: 215-737-8000 quicksearch.dla.mil
NATIONAL ASSOCAITION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM) 800 Roosevelt Rd. Building C, Suite 312 Glen Ellyn, IL 60137 Phone: 630-942-6591 Fax: 630-790-3095 naamm.org	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) 1300 N. 17th St. Suite 900 Arlington, VA 22209 Phone: 709-841-3200 nema.org
NATIONAL ELECTRICAL CODE (NEC or NFPA 70) See National Fire Protection Association	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 1 Batterymarch Pk. Quincy, MA 02169-7471 Phone: 800-344-3555 Fax: 800-593-6372 nfpa.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) 100 Bureau Dr. Stop 1070 Gaithersburg, MD 20899-1070 Phone: 301-975-2758 nist.gov	NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA) 900 Spring St. Silver Spring, MD 20910 Phone: 240-485-1165 nrmca.org
NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA) 10255 W. Higgins Rd. Suite 600 Rosemont, IL 60018-5607 Phone: 847-299-9070 Fax: 847-299-1183 nrca.net	NATIONAL SANITATION FOUNDATION INTERNATIONAL (NSF) 789 N. Dixboro Rd. Ann Arbor, MI 48105 Phone: 734-769-8010, 800-673-6275 Fax: 734-769-0109 nsf.org
NEW YORK CITY DEPARTMENT OF BUILDINGS 2014 CONSTRUCTION CODES: BUILDING CODE 280 Broadway New York, NY 10007 Phone: 212-566-5000 www1.nyc.gov/site/buildings/codes/2014-construciton-codes.page#bldgs	NEW YORK CITY DEPARTMENT OF BUILDINGS 2011 ELECTRICAL CODE 280 Broadway New York, NY 10007 Phone: 212-566-5000 www1.nyc.gov/site/buildings/codes/electrical-code.page
U.S. DEPARTMENT OF LABOR – OCCUPATIONAL SAFETY AND HEALTH (OSHA) 200 Constitution Ave., NW Washington, DC 20210 Phone: 800-321-6742 OSHA.gov/law-regs.html	PLASTIC PIPE AND FITTINGS ASSOCIATION (PPFA) 800 Roosevelt Rd. Building C, Suite 312 Glen Ellyn, IL 60137 Phone: 630-858-6540 Fax: 630-790-3095 ppfahome.org
PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI) 200 W. Adams St. Suite 2100 Chicago, IL 60606 Phone: 312-786-0300 pci.org	PORCELAIN ENAMEL INSTITUTE (PEI) P.O. Box 920220 Norcross, GA 30010 Phone: 770-676-9366 Fax: 770-409-7280 porcelainenamel.com

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA) 4201 Lafayette Center Dr. Chantilly, VA 20151-1219 Phone: 703-803-2980 Fax: 703-803-3732 smacna.org	SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) 400 Commonwealth Dr. Warrendale, PA 15096 Phone: 724-776-4841 Fax: 724-776-0790 sae.org
STEEL DECK INSTITUTE (SDI) P.O. Box 426 Glenshaw, PA 15116 Phone: 412-487-3325 Fax: 412-487-3326 sdi.org	STEEL DOOR INSTITUTE (SDO) 30200 Detroit Rd. Westlake, OH 44145 Phone: 440-899-0010 Fax: 440-892-1404 steeldoor.org
THE SOCIETY FOR PROTECTIVE COATINGS (SSPC) 800 Trumbull Dr. Pittsburgh, PA 15205 Phone: 877-281-7772 Fax: 412-444-3591 sspc.org	STEEL TANK INSTITUTE and STEEL PLATE FABRICATORS ASSOCIATION (STI/SPFA) 944 Donata Ct. Lake Zurich, IL 60047 Phone: 847-438-8265 steeltank.com
STEEL WINDOW INSTITUTE (SWI) 1300 Sumner Ave. Cleveland, OH 44115-2851 Phone: 216-241-7333 Fax: 216-241-0105 steelwindows.com	TILE COUNCIL OF NORTH AMERICA (TCNA) 100 Clemson Research Blvd. Anderson, SC 29625 Phone: 864-646-8453 Fax: 864-646-2821 tcnatile.com
UNDERWRITERS LABORATORIES (UL) 333 Pfingstem Rd. Northbrook, IL 60062 Phone: 847-272-8800 Fax: 847-509-6249 ul.com	WESTERN WOOD PRODUCTS ASSOCIATION (WWPA) 1500 SW 1st Ave. Suite 870 Portland, OR 97201 Phone: 503-224-3930 Fax: 503-224-3934 wwpa.org

SECTION 01 43 05 – CONTRACTOR'S WORK QUALITY
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Contractor's Quality Assurance / Quality Control Management Plan
2. Defective Work, Equipment or Materials
3. Welding Certification and Welding Inspection
4. Inspection and Testing of Concrete
5. Leakage Tests
6. Contractor's Surveyor

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	8
2.01	Manufacturers	8
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Implementation	9
3.03	Field Testing / Quality Control	9
3.04	Startup / Demonstration	9
3.05	Adjusting / Protection / Cleanup	9

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 43 10 – Quality Assurance Inspection

B. Section 01 43 15 – Witness Shop Testing

1.04 REFERENCES

A. AWS – D1.X American Welding Society

B. ASME American Society of Mechanical Engineers

C. NYS Steel Construction Manual

1.05 DESCRIPTION

A. Contractor Quality Assurance / Quality Control Plan

1. The Contractor shall establish, execute and submit to the Engineer a Quality Assurance / Quality Control (QA/QC) Management plan for the services and equipment which will be supplied under this Contract. The plan shall provide the Contractor with adequate measures for verification and conformance to defined requirements by its personnel and all subcontractors, fabricators, suppliers, and vendors.

2. The Contractor shall provide a suitable space for the Engineer and the Engineer's authorized representatives conveniently located near that part of each plant where materials or equipment to be furnished under this Contract are being manufactured, assembled, or shop tested. Each space shall be furnished with facilities for the making and keeping of records and correspondence. The reasonable use of a photocopier, telephone, and email shall be provided, as required by the Engineer.

B. Defective Work, Equipment or Materials

1. Any defective or imperfect Work, equipment, or materials furnished by the Contractor which is discovered before the Final Acceptance of the Work, or during the warranty period, shall be removed immediately even though it may have been overlooked by the Engineer and approved for payment. The Contractor shall repair such defect, without compensation, in a manner satisfactory to the Engineer.

2. Unsuitable materials and equipment may be rejected, notwithstanding that such defective Work, materials and equipment may have been previously overlooked by the Engineer and accepted or approved for payment.

3. If any workmanship, materials or equipment shall be rejected by the Engineer as unsuitable or not in conformity with the Specifications or Contract Drawings, the Contractor shall promptly replace such materials and equipment with acceptable materials and equipment at no additional cost to the City. Equipment or materials rejected by the Engineer shall be tagged as such by the Contractor and shall be immediately removed from the Site by the Contractor.

4. The Engineer may order tests of imperfect or damaged Work equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor, and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the Work, equipment, or material was not impaired, the Work, equipment or materials may be deemed acceptable, in the discretion of the Engineer. If the results of such tests reveal that the required functional capability of the questionable Work, equipment or materials has been impaired, then such Work, equipment or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect Work, equipment or material in lieu of performing the tests.

5. If, in the making of any test, it is ascertained by the Commissioner that the material or equipment does not comply with the Contract, the Contractor will be notified thereof, and it will be directed to refrain from delivering said material or equipment, or to promptly remove it from the site or from the Work and replace it with acceptable material at no additional cost to the City. Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the named material or equipment.

6. All welding must conform to the requirements of AWS D1.X, ASME Code or New York State Steel Construction manual as applicable and as approved by the Engineer. For work performed within NYC limits, all field welding required under this Contract shall be performed by New York City certified welders in accordance with the latest provisions of the New York City Building Code. Additional certification requirements are as follows:

    a. Certification for Welding – For all field- and shop-welding, the following welding qualification provisions shall apply:

        1) For all field welding, all required permits and safety plans shall be in place and adhered to.

        2) All shop welding shall be performed in accordance with the relevant work-specific requirements in the Specifications and Contract Drawings.

        3) If existing certification is not approved or not submitted, then the welders/welding shop/tack welders must be qualified in accordance with the above procedures and tests, as administered by an inspection agency approved by the Engineer. All costs associated with the required tests for certification and/or retests, if any, shall be borne by the Contractor. The Quality Assurance Section shall be given a notice of not less than 5 business days prior to such tests and may elect to witness any or all of these tests.

4) Any deviation from the above shall not be permitted without a written waiver from the Engineer or the Engineer's designee.

b. Welding inspection in New York City shall be in accordance with the latest rules of the New York City Building Code. Additionally, for welding inspection in New York City and outside of City limits the following shall apply:

c. All welds shall be inspected visually by the engineer in accordance with Section V of the ASME Code, or D1.1, Clause 6, Table 6.1 as approved by the engineer.

C. Inspection and Testing of Concrete

1. Inspection and testing of concrete shall be in accordance with the relevant work-specific requirements in the Contract.

D. Leakage Tests

1. All new pipelines and appurtenant structures and all new liquid containing structures shall be field tested for leakage after installation in accordance with the relevant work-specific requirement in the Contract.

E. Contractor's Surveyor

1. The Contractor shall retain the services of a licensed land surveyor, registered in the State of New York, to perform survey work including but not limited to establishing line and grade required for the Work, in advance of the construction; and to perform other surveying services for the Work. The surveyor shall be subject to the approval of the Commissioner. Survey drawings shall be submitted to the Engineer for approval.

2. The Contractor shall field verify all existing survey monuments including benchmarks within the area of the Work. All existing survey monuments and benchmarks shall be protected from damage during the performance of the Work. If any damage occurs to existing survey monuments or benchmarks, the Contractor shall notify the Engineer, survey, and replace in kind.

3. The Contractor shall furnish, install and maintain survey platforms, targets, benchmarks, stakes, monuments and similar facilities to be used by the Contractor in its performance of the Work and by the Engineer in the performance of its inspection services.

4. The Contractor shall perform all survey Work required before, during and after the construction Work; and shall re-establish same if disturbed and bear the entire expense of rectifying work improperly installed due to not maintaining, not protecting, or removing without authorization such established platforms, targets, benchmarks, stakes, and monuments.

5. The Engineer shall be notified before the establishment of any line, elevation or grade.

6. Survey Before Completion of Structure.

a. The Contractor shall file with the local AHJ, a survey by a licensed surveyor showing the location of the new structure before completion of the structure, pursuant to applicable local codes or regulations. One copy of the application and the survey shall be furnished to the Engineer.

b. This survey shall show the location of the structure, the elevation of the first tier of beams or of the first floor, the finished grades of the open spaces on the plot, the established curb level, and the location of all other structures on the plot, together with the location and boundaries of the lot or plot upon which the structure is constructed.

F. Inspection and testing of fill materials shall be in accordance with the applicable provisions of Section 31 23 23 – Fill and other relevant work-specific requirements in the Contract Documents.

1.06 QUALITY ASSURANCE

A. A Quality Assurance / Quality Control Management Plan must be submitted for review and approval.

1.07 SUBMITTALS

A. Quality Assurance / Quality Control Management Plan

1. Within 15 days after the commencement work date given in the Notice to Proceed (NTP), the Contractor shall provide its Quality Assurance / Quality Control Management Plan (QA/QC Plan) to the Engineer for approval. The Engineer's review and acceptance of the Contractor's QA/QC Plan shall not relieve the Contractor from any of its obligation to perform the Work.

2. Inspection of the Work by the Engineer is made solely for the benefit of the City. The inspection of the Work shall not relieve the Contractor of any of its obligations to fulfill the Contract as herein prescribed, and defective Work shall be repaired or replaced at the Contractor's sole expense. The Contractor's assigned QA/QC personnel are subject to the Engineer's review and continued acceptance. No Work covered by the QA/QC Plan shall start until the Engineer's written acceptance of the Contractor's QA/QC Plan has been obtained.

3. The QA/QC Plan should consist of the following quality elements:

a. Roles and Responsibilities, communication protocols

b. Management and Production Inspections

c. Off-Site Supplier Quality

d. Vendor Capability Inspections

e. Notification and Coordination with DEP

f. Inspection Instructions

g. Traceability
h. Pre-Activity Meeting
i. Initial Inspections
j. Witness Shop Testing and QA Inspections

B. QA Acceptance / Shipping / Material Marking and Identification
1. On-Site Receiving and Materials / Equipment Control
2. Material / Equipment Receiving
3. CMTRs / Certificate of Compliance
4. Traceability
5. On-Site Storage, Care, and Maintenance
6. QA/QC Process and Operational Procedures
7. Submittal Management
8. Request for Information (RFI)

C. Five-Phases of Inspection Procedures
1. Phase 1 – Client Pre-Activity Meeting
2. Phase 2 – Initial Inspections
3. Phase 3 – On-Going Inspections
4. Phase 4 – Witness Shop Test Inspection and QA Inspections
5. Phase 5 – Final Inspections – Punch lists

D. Inspection and Test Plan (ITP)
1. 1. Build Work Plan Procedure
2. Checklist and Hold Point Procedure
3. Witness and Hold Points
4. Control of Measuring and Calibrated Test Equipment Procedure
5. Reporting and control non-conforming work

E. Control and Responsibility
1. Non-Conformance Reporting (NCR) Disposition
2. QC Verification
3. Documentation

F. Root Cause Analysis (RCA) Process
1. Thresholds for RCA
2. Process

3. Preventive Action Plan
4. Implementation
5. Measurement of Effectiveness

G. Continuous Improvement
1. Recognition and Accountability
2. Measurement and Monitoring
3. Performance and Issues Matrix
4. Management Reviews
5. Audit and Assessments

H. Welding Control
1. Full Compliance with Specifications and Applicable Codes

I. Additional Submittals
1. When requested by the Engineer, the Contractor shall submit the following information prior to entering into a supply or service contract.
a. Contract number, supplies or services to be provided and a general description of the proposed item(s), such as trade name, type, etc. The name and address of the manufacturer or Service Company and the location of the plant at which supplies will be manufactured and tested as required, or at which the services will be performed.
b. Experimental and test data required to support the claimed performance of the supplies.
c. A description of the testing plant, including the hydraulic, electrical and other facilities, in sufficient detail to show that the plant is adequately equipped for performing the tests, if such testing is required.
d. Any additional information that the Engineer may deem necessary in order to determine the ability of the supply or service company to produce the item as called for by the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials and equipment must be received, stored in a safe and adequate environment as per approved procedures.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. All Work of assembly, installation, and construction shall be done in a neat, first class, and workman like manner. Material, fixtures, fittings, supplies, equipment or Work required by the Contract Drawings that does not agree with the Specifications will not be accepted, and the Contractor shall supply the required quality. In asking for prices on, or placing orders for, materials, fixtures, fittings, supplies, and equipment intended for use or installation under this Contract, the Contractor shall provide the manufacturer or dealer with such complete information from these Specifications as may in any case be necessary. In every case, the Contractor shall quote in full to each such manufacturer or dealer the text of this subparagraph, as well as the text of such other portions of the contract, as are appropriate.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Notice of Intent to Commence Manufacture

1. The Contractor shall give notice in writing to the Commissioner sufficiently in advance of its intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction as detailed in Section 01 43 10 – Quality Assurance Inspection and Section 01 43 15 – Witness Shop Testing. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Commissioner will: arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials; or notify the Contractor that the inspection will be made at a point other than the point of manufacture; or notify the Contractor that inspection will be waived.

2. In those instances, where the DEP inspector(s) arrive at the agreed-upon location, at the agreed-upon date and time, and find that the article(s) to be inspected are not ready for inspection, the inspector(s) shall return to their home office and all expenses incurred shall be borne by the Contractor and

shall be deducted from the Contractor's next payment, unless otherwise determined by DEP.

B. Field Measurements

1. The Contractor shall take all necessary measurements in the field to determine the exact dimensions for all Work and verify all pertinent data and dimensions shown on the Contract Drawings.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All materials and equipment must be protected and wrapped during transport, storage, and post installation.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 43 10 – QUALITY ASSURANCE INSPECTION
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance Inspection

2. Inspection Expenses

B. The following index of this Section is presented for convenience:

C.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Implementation	6
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 43 05 - Contractor's Work Quality

C. Section 01 31 25 - Web-Based Project Management Information System

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. List of Equipment Subject to Quality Assurance (QA) Inspection

1. DEP's Bureau of Engineering Design and Construction, Quality Assurance Section intends to perform QA inspection for specific items being supplied under this Contract.

2. The selected equipment is subject to QA inspection by the Quality Assurance Section during any or all stages of manufacture. The Contractor shall adhere to the QA inspection requirements indicated in the respective Specifications for the items designated for QA inspection. The related Specifications for each item furnishes specific inspection requirements for that item.

3. See Table 1 - List of Equipment Scheduled for QA Inspection, attached at the end of this Section.

B. QA Inspection of Contract Items

1. The City may, as deemed necessary, perform QA inspection of any items that have not been designated as such in the Contract. The City also may remove items from the list of items designated for inspection, at its discretion.

2. The Engineer may require, at their discretion, QA inspection of any item required by the Contract at any stage of manufacture, assembly, inspection or testing. Inspection or shop witness testing may be required even when not explicitly requested in the Contract Documents. The Engineer shall have access at all times, while work under this Contract is being performed, to all parts of the Contractor's or manufacturers' plants or other locations where the equipment, materials, fittings, supplies or any other articles required under this Contract are manufactured, assembled, tested, or inspected; and the Engineer shall be permitted to witness any or all of these operations as they may deem necessary to determine that all work is being performed in accordance with the Contract Documents and the approved shop drawings.

3. In the event that the City chooses to perform QA inspection of any items in the Contract, the City will issue a notice to the Contractor that identifies the items and provides direction to the Contractor to facilitate the inspections. This notice will be followed by formal inspection instructions for the QA inspection of each item.

4. For all equipment, the Contractor shall be subject to all requirements described for the manufacture of equipment in the Contract. Regardless of the level of QA inspection activities required by the City, the Contractor

shall be responsible to submit, at a minimum, all documentation and samples that are required in the applicable Specification.

C. Requirements for Inspection of Equipment Designated for QA Inspection by the City

1. The Contractor is responsible for facilitating the inspection process and shall coordinate the same by contacting the Chief of Quality Assurance, DEP Bureau of Engineering Design and Construction.

2. For items designated for QA inspection, the following statement shall appear on the face of purchase orders and shop drawings issued by the Contractor for work to be incorporated in this Contract. The Contractor shall also instruct the approved manufacturers or dealers to place this statement on purchase orders and shop drawings issued by them for such work.

D. *"This order is subject to inspection by the Bureau of Engineering Design and Construction of the Department of Environmental Protection of The City of New York and shall not be processed until inspection instructions have been issued by the Engineer. Please contact the Chief of Quality Assurance, DEP Bureau of Engineering Design and Construction, 96-05 Horace Harding Expressway, Corona, New York 11368. 718-595-3000"*

1. For items designated for QA inspection, the Contractor shall submit each purchase order to the Engineer when placed with the manufacturer or dealer. Submittals of preliminary/initial shop drawings, with detailed assembly drawings and bill of materials, shall be provided to the Quality Assurance Section as soon as they are available, or have been sent to the Engineer for review. Upon receipt of the purchase order and shop drawings, the Quality Assurance Section will issue inspection instructions to the Contractor (a copy of which will also be sent to the manufacturer/supplier.)

2. For items designated for QA inspection, the Contractor shall not proceed with the work until the inspection instructions have been issued. Once the receipt of the inspection instructions has been acknowledged and verified, the Contractor shall provide advance notice of readiness for inspection at the required witness points. Advanced notice shall be provided in accordance with Article 3.02D. The inspection instructions will indicate what specific phases of manufacture, QA inspections, and/or tests that the Quality Assurance Section inspectors intend to witness.

3. The Contractor shall provide Quality Assurance Section with the approved shop drawings as soon as possible after receiving approval from the Engineer. The Quality Assurance Section reserves the right to issue revisions/clarifications to the original inspection instructions based on the approved drawings, and/or as deemed necessary.

4. The requirements for inspection are in addition to and separate from any specified witness shop testing and shall in no way affect procedures or requirements with respect to the same.

5. The Engineer may reject any item or material if manufactured prior to inspection or where the requirements specified in the inspection instructions are not followed.

E. Selection of Inspection Agencies

1. The Engineer will select and designate all persons, firms or corporations to make or witness each and every and all inspections, tests or analyses, with or without reports unless indicated otherwise in the Specifications.

2. If a retest is required, the cost shall be borne by the Contractor.

3. When Quality Inspections are waived by the Engineer, the manufacturer's data and the interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be submitted to the Engineer for approval.

4. All equipment and material shall be identified with serial numbers and/or approved permanent type identification marks.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual inspection of welding, as per applicable welding code if applicable.

c. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Certified Material Test Reports

1. When no direct test, inspection, or analysis of materials, products or equipment is required to be performed at the point of manufacture, and when the Commissioner so requires, the Contractor shall furnish authoritative evidence in the form of Certified Material Test Reports (CMTRs) that the materials, products, or equipment to be used in the Work have been manufactured and tested in conformity with the applicable material specification. The CMTRs shall indicate the results of physical tests and chemical analyses made directly on the same heat or heats from which any and all materials are furnished under this Contract. The costs of furnishing CMTRs and the results of tests or analyses shall be borne by the Contractor and shall be deemed to be included in the overall price bid for the Contract.

2. When materials or manufactured products comprise such small quantities that it is not practicable to make physical tests or chemical analyses directly on the materials or products furnished, a certificate stating the results of such tests or analyses of similar materials or products which were concurrently produced may, at the discretion of the Commissioner, be considered as the basis for the acceptance of such materials or manufactured products Delivery, Storage, and Handling

B. Submittal of Samples of Materials for Testing

1. When required or requested by the Engineer, specified samples of materials, equipment, and appliances, identified in a manner acceptable to the Engineer shall be submitted by the Contractor for approval by the Engineer. The samples shall be submitted sufficiently in advance of the time when the materials are to be used so that rejections thereof will not delay the approved construction schedules. Approved samples will be labeled and dated.

2. As directed and specified below, the Contractor shall be required to furnish and deliver to the DEP Bureau of Engineering Design and Construction Quality Assurance Chemical Laboratory located at 96-05 Horace Harding Expressway, Corona, New York 11368-5107, or any other designated location, samples of metals from vendor’s plants engaged in the manufacture of mechanical equipment and structural components.

3. A minimum of two (2) un-machined material samples of sufficient size shall be supplied from each material heat lot for the components identified as requiring samples for independent verification of both chemical and physical test results. Material samples shall be provided in accordance with the applicable material specifications (ASTM, etc.) and shall be provided with unique product markings in the form of a stamped-on heat number, etc. that is traceable to the applicable CMTR.

4. Samples shall be taken in the presence of the Engineer and at the location point determined by the Engineer, from material, equipment, or appliances at the work-site or at the manufacturing or testing facilities of the

Contractor's vendors or sub-vendors during the facilities' normal working hours, unless otherwise approved.

5. Approved samples will be retained for record purposes at a location designated by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials & equipment must be received, stored in a safe & adequate environment as per approved procedures

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Contractor Shall Maintain Traceability during Stages of Fabrication and Testing

1. The Contractor shall be responsible to maintain traceability of most equipment components such as castings, structural members, plate, forgings, piping, machining, etc., and all other articles required under this Contract during all stages of fabrication and testing.

B. Contractor Responsible for all Tests

1. The chemical and physical tests, including the optional tests, called for in the ASTM, federal and other specifications cited in this Contract shall be made as specified, unless otherwise approved.

C. Testing Compliance

1. Contractor's testing personnel shall make the necessary inspections and tests.

2. The reports thereof shall be in such form as will facilitate checking to determine compliance with the Specifications and shall indicate all the analyses and/or test data and interpreted results thereof.

D. Contractor Shall Provide Engineer with Advance Notice of Sampling and Testing

1. The Engineer shall be informed in advance of all times of sampling and testing, and shall witness these operations if the Engineer so desires.

2. A minimum notice of two (2) weeks shall be provided for items of domestic manufacture and eight (8) weeks for items of foreign manufacture.

E. Testing Performed in Engineer's Presence

1. When requested or specified, testing and examinations of all kinds and any weighing required under this Contract shall be done in the presence of the Engineer unless otherwise approved.

2. Testing shall be scheduled during the normal eight (8) hour day shift with adequate advance notice of intent to schedule tests shall be given to the Engineer.

F. Contractor Shall Provide Engineer with Calibrated Instruments

1. The Contractor shall provide, for use by the Engineer, all measuring devices, instruments, and other appliances that the Engineer may deem necessary to carry out the designated inspection of the work. All such instruments and devices shall be calibrated, as per manufacturer's instructions, and shall bear the calibration marks, stamps, or seals of an approved testing body or agency with reference standards traceable to those held by the National Institute of Standards and Technology, or other approved standard. The Contractor shall maintain all instruments and devices in good working order and shall recalibrate them when so directed by the Engineer. The cost, if any, of providing and maintaining such equipment shall be considered part of the Contractor's normal expense of conducting business and therefore non-reimbursable.

G. Contractor Shall Provide Utilities, Equipment, and Services to Assist Testing

1. Electric power, instruments, gages, threaded fasteners, bulkheads, blind flanges, gaskets, piping, equipment, materials, tools, other appurtenances, services necessary for the various specified shop and field tests, scales for

weighing, and assistance for measuring or weighing any of the materials shall be provided by the Contractor.

H. Contractor's Responsibility for Testing Laboratory

1. The Contractor shall provide the services of approved testing laboratories to perform such physical and chemical tests and such examinations as required, if the manufacturer's testing facilities are not approved. In such a case, the Contractor shall provide and prepare test specimens and promptly submit reports of all tests.

I. Contractor's Responsibility for Schedule Reports

1. The Engineer shall be provided with detailed daily and weekly schedules of manufacturing plant operations pertaining to Work, sufficiently in advance of such operations, so that adequate preparation can be made for inspecting the Work. The sequence of operations for the complete manufacturing process as well as periodic production status reports shall also be provided. Any Work performed without such sufficient advance notice to the Engineer is subject to rejection.

J. Approval of Work Subject to Contractor's Inspection Reports

1. Completion of all requests for the approval of completed Work shall be accompanied by the Contractor's own inspection report of such Work, submitted on the form or forms previously approved and with the applicable approved shop drawings. Any equipment part which has been manufactured and/or assembled using uninspected or unapproved parts or materials shall be disassembled, as ordered by the Engineer, in order that it may determine the acceptability of such parts or materials by means of any tests or examinations it may require. The cost of such ordered disassembly and subsequent reassembly shall be borne by the Contractor.

K. Approval of Inspection Activities prior to Shipping

1. Upon completion of the designated QA inspection activities at the facility where the inspection has occurred, the Contractor shall obtain from the Engineer a formal release from inspection indicating that no further inspection is required prior to shipping.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All materials and equipment shall be protected & wrapped during transport, storage & post installation.

END OF SECTION

TABLE 1
LIST OF EQUIPMENT SCHEDULED FOR QA INSPECTION

Specification Reference (or Drawing)		Equipment Scheduled for QA Inspection
Section No.	Section Title	
05 05 23.02	Miscellaneous Metal Fastenings	Miscellaneous Metal Fastenings
05 12 00	Structural Steel Framing	Structural Steel Framing
05 50 00	Metal Fabrications	Portable Fall Protection System components, Vertical Ladders, HLRT Bar Rack, HLRT Bulkhead, and End Sill Bar Rack
05 59 16	Fabricated Metal Access Hatches	Floor Access Hatches
05 52 13.07	Aluminum Pipe Railing	Aluminum Pipe Railing
08 03 00	Waterproof Doors	Watertight Access Door
08 91 20	Fixed Louvers	Fixed Louvers
23 31 14	Metal Ducts and Accessories	Metal Ducts and Accessories
40 05 06	Couplings Adaptors Specials For Piping	Pipe Couplings
40 05 07	Hanger and Supports for Process Piping	Hanger and Supports for Process Piping
40 05 22	Steel and Stainless Steel Process Pipe	Steel and Stainless Steel Process Pipe
40 05 53	Process Valves 24-Inch Diameter and Larger	Process Valves 24-Inch Diameter and Larger
40 05 54	Steel Pipe and Fittings	Steel Pipe and Fittings
40 05 58	Bonneted Knife Gate Valves	Bonneted Knife Gate Valves, Gear Box, and Actuators
41 67 16	Fall Protection Systems	Fall Protection System

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required, to perform all Witness Shop Tests. The Contractor shall be responsible for all expenses for scheduled Witness Shop Testing.

B. The following index of this Section is presented for convenience:

C.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Application	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

D. The following schedule, attached after the End of Section designation, is a part of this Section:

1. Schedule 01 43 15–1, Witness Shop Test Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 43 10 – Quality Assurance Inspection

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. All equipment listed in Schedule 01 43 15-1, Witness Shop Test Schedule shall undergo witness shop testing as specified.

B. Witness Shop Testing of Additional Items: The City reserves the right to require Witness Shop Tests for additional items that are not listed in Schedule 01 43 15-1 or designated as requiring Witness Shop Tests in the Contract Documents.

1. When additional Witness Shop Tests are required by the Engineer, any additional costs resulting therefrom shall be paid either:

a. Out of a specified allowance, or

b. By change order procedure.

C. Advance Notice for Witness Shop Testing:

1. The Contractor shall notify the Engineer in advance of all scheduled witness shop tests as follows:

a. Sixty consecutive calendar days (60 ccd) in advance for witness shop tests in the continental United States.

b. Ninety consecutive calendar days (90 ccd) in advance for witness shop tests outside the continental United States.

2. The Contractor's advance notification shall include, at a minimum, the following information, which will be submitted to the Engineer for approval as specified herein:

a. A diagram of the proposed testing arrangement.

b. A description of the proposed manufacturer's inspection and testing facilities and procedures.

c. A list of all instruments the manufacturer proposes to use for the tests with initial and last calibration reports certified by an approved independent testing laboratory. (All instruments shall be of ranges suitable for the quantities to be measured.)

d. Sample test data sheets.

e. Sample calculations.

f. Descriptive matter on the testing equipment which shall contain illustrative photographs, drawings, and such other matter as may be requested by the Engineer.

g. The approved Shop Drawing(s) for installation of the equipment to be tested shall be listed in the Contractor's notice and made available to Agency representatives during witness shop testing.

D. Should the equipment or instrumentation not be ready for testing at the scheduled time of the shop time, as per prior submitted approved data and / or the Contract Document requirements, then the scheduled shop testing will be terminated and the witnesses will return to their home office (See paragraph 1.05.K.3.a.2).

E. Witness Shop Testing Attendee Requirements:

1. Contractor: A duly authorized representative of the Contractor shall be present during each witness shop test.

2. Engineer: When Schedule 01 43 15-1 and/or the Engineer require witness shop tests for equipment, the only tests which will be accepted are those made in the presence of the Engineer or the Engineer's representative.

F. Witness Shop Test Facility: Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified, shall be tested in an approved facility in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.

G. Tests shall be conducted in accordance with the test codes of the ASME and the IEEE.

H. Witness Shop Test Results:

1. The results of the shop tests shall be considered official and conclusive for the purpose of determining whether or not the equipment is in accordance with the performance requirements as specified.

2. No such equipment shall be shipped to the work site until the Engineer notifies the Contractor in writing that the results of the Witness Shop Test(s) are acceptable.

I. Certificate of Authenticity:

1. Inspection and shop test data and interpreted results thereof accompanied by a certificate of authenticity sworn to, before a notary, by an officer of the manufacturing company, shall be forwarded to the Engineer for review and approval as required.

2. When witness shop tests are waived by the Engineer, the manufacturer's actual test data and the interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be submitted to the Engineer for approval.

J. Serial Numbers: All equipment and material to be Witness Shop Tested shall be identified with serial numbers and/or approved permanent type identification marks.

K. Expenses:

1. Witness Shop Testing:
    a. For the equipment to be witness shop tested, whether of foreign or domestic manufacture, the Contractor shall be responsible for the costs for a minimum of two (2) representatives of the Engineer or the Agency, including all round trip transportation, food, lodging, and miscellaneous expenses for each witness shop test.
        1) Refer to the corresponding specification section(s) listed in Schedule 01 43 15-1 for additional requirements.
    b. The Contractor shall make all required travel and lodging arrangements that shall be in accordance with the New York City Comptroller's Office Directive No. 6 or a later or equivalent City document. All arrangements shall be submitted for approval of the Engineer.
2. The duration of each witness shop test shall be as required for conducting all specified performance tests, as determined by the Agency.
3. Retesting:
        1) If a retest is required, the entire retest cost of the retest shall be borne by the Contractor.

1.06 QUALITY ASSURANCE

A. Unless otherwise approved by the Engineer, all Witness Shop Tests for equipment shall take place at the point of manufacture and/or origin.

B. Witness shop testing of equipment shall be performed in accordance with:
1. The procedures described herein, and
2. The Witness Shop Test requirements of the Specification Section(s) referenced in Schedule 01 43 15-1, Witness Shop Test Schedule.

C. Where applicable, prior to the witness shop testing, the Contractor shall ensure that the equipment to be witness shop tested have met the requirements and approved by the Engineer as specified in Section 01 43 10 – Quality Assurance Inspection.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents.

B. In addition, for each item of equipment listed in Section 01 43 15-1, Witness Shop Test Schedule, the Contractor shall submit the following:
1. Action Submittals:
    a. Advance notice for each item, as specified herein.
    b. Test Report Documents: Submit two (2) copies of a detailed Witness Shop Test performance test report, including but not limited to the followings documents:
        1) Copy of the Witness Shop Test procedure.

2) Final diagram of the testing arrangement.

3) Copies of the raw test data sheets.

4) Copies of the tabulated test data work sheets.

5) Copies of the instrumentation calibration certificates.

6) Calculations.

7) Characteristic curves, for graphical representation of the performance test data.

8) Copies of the photos taken during the test.

9) Certification of authenticity by the Manufacturer, as specified herein.

10) Non-editable electronic (e.g., PDF) copy of the complete report including all supporting documents.

11) Additional information necessary for evaluating performance of the equipment against the requirements of the Contract Documents.

C. Refer to the individual Specification Section(s) referenced in Schedule 01 43 15-1 for additional submittal requirements regarding Witness Shop Testing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 01 43 15–1
WITNESS SHOP TEST SCHEDULE

Specification Reference:		**Equipment Scheduled for Witness Shop Testing:**
Section No.	**Section Title:**	
05 50 00	Metal Fabrications	HLRT Bar Rack and HLRT Bulkhead
40 05 22	Steel and Stainless Steel Process Pipe	Steel and Stainless Steel Process Pipe
40 05 58	Bonneted Knife Gate Valves	Bonneted Knife Gate Valves, Gear Box, and Actuators
40 80 81	PMCS Factory Testing	PMCS Equipment

NO TEXT ON THIS PAGE

SECTION 01 43 20 – APPROVAL OF PRODUCT MANUFACTURERS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for the use of Product Manufacturers of materials and equipment and the substitution requirements for the use of equivalent materials and equipment.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. A “Named Manufacturer” is defined as a company cited by name in a Specification Section that manufactures, fabricates, assembles, and/or integrates materials,

fixtures, equipment, appliances, or other fittings. Named Manufacturer does not mean a distributor, sales representative, and/or supplier.

1.05 DESCRIPTION

A. Approval of Manufacturers (General)

1. All transactions with manufacturers shall be through the Contractor.

2. Similar materials and equipment of one and the same kind, type or classification that are used for identical purposes shall be made by the same manufacturer, except that multiple manufacturers may be approved for commodity items including, but not limited to, such items as concrete, conduit and cable, at the discretion of the Engineer.

3. Approval of a proposed manufacturer is conditional upon compliance with the Contract Documents as determined by the Engineer during the subsequent review of the Contractor's submitted Shop Drawings.

4. Unless otherwise approved by the Engineer, the Contractor shall be granted approval for one manufacturer per item.

5. For items of significant import or requiring specialized manufacturing, the Engineer may deny approval based on a determination that the proposed manufacturer:

a. Does not have a plant of sufficient capacity with a production force and plant facilities of the type and size suitable to produce the specified equipment or material required;

b. Does not have an operating quality control department with an experienced and qualified staff;

c. Has not successfully produced similar equipment or materials for at least three (3) years; or

d. Has previously failed to adhere to product specifications, scheduling, delivery requirements, or warranty obligations in connection with City contracts and projects.

B. List of Named Manufacturers in the Bid Booklet

1. The bidder shall indicate on the form in the Bid Booklet (when included) entitled "LIST OF EQUIPMENT/MATERIAL MANUFACTURERS," which manufacturer the bidder intends to use for each item of equipment or material listed on that form, by either:

a. Writing in one of the Named Manufacturers specified in the Specifications for that equipment or material, in which case the indicated Named Manufacturer is not subject to approval by DEP and shall be utilized for that item as part of the Work of the Contract; or

b. As an alternative to selecting a Named Manufacturer, a proposed "or equal" may be submitted for any of the items.

The proposed "or equal(s)" must be indicated in the designated column on the form. The submittal of more than one manufacturer for each item of equipment/material will not be permitted. No other requests for substitutions for these items may be submitted during the Work of the Contract, unless otherwise approved by the Engineer.

c. The bidder shall certify its selection of manufacturers by signing the List of Equipment/Material Manufacturers form..

2. The procedure for review by the Engineer for the "or equal" items proposed with a bid on the List of Equipment/Material Manufacturers form shall be as follows:

a. Within 14 days following bid opening, the apparent low bidder shall submit sufficient information to substantiate that the item proposed is the equivalent of that of the Named Manufacturer.

b. Wherever:

1) Information substantiating the request for approval of a substitution is not submitted within said 14-day period, or

2) The submission in support of proposed "or equal" material or equipment has been judged to be unacceptable by the Engineer, then the bidder (if awarded the Contract) shall provide the material or equipment of a Named Manufacturer as specified in the Contract Documents and must submit, within seven calendar days after notice, a revised List of Equipment/Material Manufacturers form identifying the manufacturer of the material or equipment to be provided. If the Contractor fails to timely make this submission, the award may be rescinded and the bid rejected as non-responsive

c. No Shop Drawing submittals shall be made for a proposed "or equal" item prior to approval of List of Equipment/Material Manufacturers form.

C. Named Product Manufacturers Not on the List in the Bid Booklet

1. Whenever materials or equipment not included on the Bid Booklet List of Equipment/Material Manufacturers are indicated in the Contract Documents by referring to a particular Named Manufacturer, the naming is intended to establish the type, function, and quality required. Unless the Contract specifies an item as "Brand Name Only" with no substitution of any "approved equal" allowed, then materials or equipment of other manufacturers may be approved, if sufficient information is submitted to

allow the Engineer to determine that the material or equipment proposed is equivalent or equal to that of the Named Manufacturer.

2. For such materials or equipment, proposed “or equals” may be submitted and reviewed as part of the Contractor’s Shop Drawing approval process. The following shall apply to such determinations:

   a. The Engineer will be the sole judge as to the type, function, and quality of any proposed “or equal” and the Engineer's decision shall be final.

   b. The Engineer may require the Contractor to furnish additional data about the proposed "or equal."

   c. Approval by the Engineer of an “or equal” item shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents.

   d. The Contractor shall pay all costs of implementing approved "or equal(s)”, including any redesign and changes to the Work necessary to accommodate the substitution. These shall include resulting costs incurred by other Contractors (if any) on the project.

D. The following provisions shall apply to all requests to substitute equipment or material manufacturers:

1. The Contractor may be granted approval for one manufacturer per item. However, during the performance of Work, multiple manufacturers may be approved for certain commodity items at the sole discretion of the Engineer, upon written request by the Contractor. The Contractor must include a justification in the written request.

2. The Engineer will evaluate each proposed “or equal” within a reasonable period of time.

3. No substituted item shall be ordered, installed, or utilized without the Engineer's prior written approval of the proposed “or equal.”

4. The bidder’s or Contractor’s substantiating information, which will be considered by the Engineer in evaluating a proposed “or equal”, shall address the following factors:

   a. Whether it is equal in construction, function and efficiency to that of the Named Manufacturer.

   b. Whether acceptance of the proposed “or equal” will cause delay in the Contractor's achievement of Substantial Completion.

   c. Whether acceptance of the “or equal” for use in the Work will require a change in any of the Contract Documents to adapt the design to the proposed substitution.

   d. Whether incorporation or use of the “or equal” in connection with the Work is subject to payment of any ongoing license fee or royalty.

e. The availability of maintenance, repair, and replacement service. The proposed Manufacturer shall have a service agency that is staffed by properly trained personnel and maintains adequate spare parts, and is able to respond and complete repairs within 24 hours.

f. An itemized estimate of all costs that will result directly or indirectly from approval of such “or equal,” including cost of any required redesign and potential claims of other Contractors affected by the resulting change.

g. Whether the proposed “or equal” item meets or exceeds the requirements listed in the appropriate Specifications.

E. Changes Resulting From Approval of Proposed "Or Equal"

1. The Specifications and Contract Drawings were prepared to accommodate the equipment furnished by the Named Manufacturers. All motor horsepower, connecting pipe sizes, equipment dimensions, etc., shown are based on the best information available at the time of design.

2. If proposed "or equal" equipment is different in dimensions, horsepower requirements, pipe connection sizes or other material characteristics from that provided for in the Contract Documents, and such difference is not the result of changes in design conditions or concept ordered by the Engineer, then the Contractor shall be responsible for the furnishing of all properly sized pipe connections, motor starters, motor control centers, and electrical wiring and connections, and all other Work required to properly install the equipment in complete operating condition.

3. Any necessary redesign resulting from any proposed “or equal” shall be submitted to the Engineer for approval, along with the submission of substantiating information in support of the proposal.

4. The cost of all such revisions shall be considered to be included in the bid price(s) on the Contractor’s Bid Schedule of Prices.

5. The Contractor shall, at no additional cost to the City, be responsible for and pay all costs in connection with any proposed “or equal,” including, without limitation, inspections and testing of equipment or materials submitted for review prior to the Contractor's purchase thereof, whether or not the Engineer approves the proposed “or equal.” The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering an “or equal” proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 51 11 – TEMPORARY WATER AND SANITARY SERVICES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances to furnish, install, and test all temporary water services and temporary sanitary services, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	3
3.05	Adjusting / Protection / Cleanup	3

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. The Contractor shall provide and maintain temporary city water and sanitary services for the use of Contractor's personnel on the Site. In addition, the Contractor shall provide all water required to perform the Work of this Contract.

1. Temporary Sanitary Services:

a. Toilet facilities, both exterior and interior, shall be furnished and installed for use by the Contractor's personnel. Toilet fixtures shall be furnished, installed and maintained in satisfactory operating condition. The Contractor shall keep the temporary toilet fixtures in a clean and sanitary manner.

b. Enclosures for the toilet fixtures shall be erected and maintained in a clean and sanitary manner.

c. Heating and lighting for the enclosures shall be furnished, installed and maintained by the Contractor.

2. Temporary Water Services:

a. The Contractor shall be responsible for providing a stationary water tanker for water supply to the Engineer's temporary offices.

b. The Contractor shall be responsible for preventing all temporary pipes and hoses from freezing.

c. The Contractor shall be responsible for providing appropriate backflow preventers where necessary to protect against contamination of the water supply.

d. The Contractor shall provide sufficient potable quality drinking water for all personnel employed by the Contractor at the Site.

e. All costs for water supply for the Engineer's and Contractor's temporary offices shall be borne by the Contractor.

B. The Contractor shall provide and maintain all temporary water and sanitary services at the site during construction in compliance with all applicable State and local regulations.

1. It shall be the Contractor's responsibility to obtain all necessary permits from local authorities having jurisdiction.

C. Potable water shall be used for testing of potable water lines and domestic needs.

D. The Contractor shall remove all temporary water and sanitary services at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 51 12 – TEMPORARY HEAT AND VENTILATION
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as specified and required, to furnish, install, and test all Temporary Heat and Ventilation, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General:

1. In order to permit construction to continue as scheduled during all seasons of the year, the Work of the Contract shall be protected at all times from the harmful effects of low temperature and from accumulation of harmful gases such as chlorine, methane and hydrogen sulfide.

2. Labor may be required seven days a week and during other than Normal Project Working Hours as described in Section 01 14 00 – Work Restrictions for the period of time required by seasonal weather conditions.

3. The Contractor shall begin to supply temporary heat only when so directed in writing by the Engineer and shall continue to supply temporary heat until directed in writing by the Engineer to discontinue.

4. In prosecuting the Work of this Contract, the Contractor shall provide all temporary ventilation necessary for the protection of the Contractor's employees, all other persons at or about the Contractor's Work area, Work, and equipment of the Contractor. Temporary ventilation shall be in accordance with all applicable regulations of the Federal Occupational Safety and Health Act of 1970.

B. Methods:

1. The methods of temporary heating and ventilation shall be in conformance with all applicable Federal, State, and Local regulations and shall be subject to the approval of the Engineer.

2. No open fires will be permitted. No salamanders or other direct-fired equipment will be allowed in areas where the use of such equipment will damage or deteriorate the construction or finishes, or cause harm to persons working in the area.

3. Heating systems shall be complete including, but not limited to, torpedo blowers, and/or propane heaters, unit heaters, fuel storage facilities, and other necessary equipment.

4. The Contractor shall provide and maintain the temporary heating and ventilation facilities for the duration of the Contract.

5. The Contractor shall remove all portions of the temporary heating and ventilation systems when so directed by the Engineer.

C. Electrical Power for Temporary Heating and Ventilation System:

1. Temporary Heating System:

a. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary heating systems.

2. Temporary Ventilation System:

   a. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary ventilation systems.

3. Temporary electrical system shall comply with the latest applicable regulations and codes referenced elsewhere in the Specifications.

4. The Contractor shall remove all temporary heating, ventilation and related electrical services at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 51 30 – TEMPORARY ELECTRICAL SYSTEM
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The temporary electrical system shall be furnished, installed, operated and maintained in accordance with the requirements of this Section and the Contract Drawings.

B. The temporary electrical system shall supply power and light as required for the construction related activities. The temporary electrical system shall be complete and shall include all auxiliary equipment necessary to support the construction.

C. Attachments

1. Schematic Diagram for Temporary Electrical System Arrangement

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 26 05 27 – Grounding

1.04 REFERENCES

A. Temporary electrical system shall comply with the latest applicable provisions and recommendations of the following:

1. Electrical Code of the State of New York.
2. NFPA 70, National Electrical Code.
3. National Electrical Safety Code.
4. Local Codes.
5. NYC Local Law 18 of 2014
6. Local Utility Requirements.
7. OSHA Regulations.

1.05 DESCRIPTION

A. System Description

1. The Contractor shall make all necessary arrangements with the Utility and shall provide a temporary electrical service point connection. Connecting lines and service supply shall be of sufficient capacity to supply all temporary light and power required on the site.
2. Arrangements shall be made with the Utility immediately after notice to commence work in accordance with these Specifications.
3. The service shall have provisions for meter connections for the Contractor on the worksite and the Engineer's field office. The service shall be branched and metered using circuit breakers or fused switches and meters.
4. The Contractor shall be responsible for making arrangements with the Utility to have a sealed meter installed and for payment of same.
5. The energy charges for the Contractor's field office and shop usage shall be the responsibility of the Contractor.
6. Energy charges associated with the work areas general power and lighting and the security site lighting shall be the responsibility of the Contractor. Energy charges associated with the Engineer's field office shall be the responsibility of the Contractor.
7. The Contractor requiring additional temporary power and light, beyond that provided as specified herein, shall arrange with the utility for such additional temporary power and light and shall bear the costs of all material

and ancillary equipment necessary. Removal of such additional temporary power and light shall be at the expense of the Contractor.

B. Design Requirements

1. The Contractor shall provide all systems and circuits in accordance with the Electrical Code of the City of New York, NFPA 70, the National Electrical Safety Code, local codes, utility codes, and OSHA requirements.

2. The temporary electrical system shall be provided in accordance with the following design requirements:

a. The Contractor and the Engineer's trailer shall have a separate branch.

b. A separate branch shall supply the work area general lighting, power, and security. Receptacles (GFI type) shall be located throughout the work area. Receptacle connected equipment shall be suitable for 120-volt operation. Illumination levels shall be as required by OSHA.

c. Security site lighting circuits shall supply a system of security lighting for the work area, field office complex(s), Contractors' staging areas, and all parking areas. Unless specifically shown otherwise on the Contract Drawings or stated in the Specifications, the system shall be arranged to provide a minimum lighting intensity of 5 foot-candles in these areas.

d. A total of three (3) meter pans and fused disconnect switches rated for 120/208 volt, 3 phase, 4 wire shall be furnished, installed and wired for the above. The Resident Engineer's trailer complex shall consist of five trailers combined for one trailer complex. Each of the five trailers shall include a 200A 120/208 volt, 3 phase, 4 wire circuit breaker panel.

e. See attached schematic diagram for Temporary Electrical System Arrangement.

C. The Contractor shall remove all temporary electrical systems at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. The temporary general lighting system shall provide lighting for access to and egress from the Work and for safe and expeditious construction within designated enclosed areas of the structure or structures.

B. All temporary electrical system equipment and components shall be of recent manufacture and of proper working order for the intended purpose.

C. The Contractor shall maintain in proper working order and repair the temporary electrical system.

D. The Contractor shall modify, extend, and relocate the temporary electrical system components, as needed, to support construction activities

E. The Contractor shall remove the temporary electrical system when directed by the Engineer.

1.07 SUBMITTALS

A. Contractor shall submit working drawings, shop drawings and material specifications for the approval of the Engineer and the utility in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

B. Working Drawings:

1. One-line diagram representing the power distribution for the temporary system.

2. Location plan indicating the major distribution equipment.

3. Manufacturer's catalog cuts for the products proposed for use.

4. Panel loading, voltage drop, short circuit and other calculations, as required.

5. Security lighting layout.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The temporary electrical equipment shall be delivered, stored and handled in accordance with these Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Electrical Service Connection

1. The Contractor shall provide a service entrance and distribution center at the service point. Service entrance and distribution equipment shall be in accordance with the following:

a. Enclosures shall be rated NEMA 3R.

b. Meter pans shall be suitable for revenue meters furnished by the utility.

c. Circuit breakers shall be thermal magnetic type. Circuit breakers shall be equipped with lockable handles.

d. Disconnect switches shall be fused type with current limiting fuses. Disconnect switches shall be equipped with padlocking features.

e. All equipment shall be approved by the Utility.

2. The Contractor shall also provide the following other equipment at the service point:

a. Eight foot high, steel chain link fence with gate shall enclose the service entrance and distribution center. The fence shall be arranged so to permit a minimum clearance distance of 6 feet between the fence and the equipment.

b. The fence shall include baked enamel, 14 by 10 inch caution signs. The signs shall read, “DANGER - HIGH VOLTAGE - KEEP – OUT”. The signs shall be bolted to the fence on each side of the fence and on the main gate.

c. A 4/0 AWG ground grid consisting of four ground rods, one at each corner, shall be provided. Maximum ground resistance shall be 10 ohms. Grounding shall be in accordance with Article 2.03.

B. Raceways and Wiring

1. All conductors shall be 600 volt, enclosed in properly sized raceways or be routed aerially using Type AC, MC or TC cable.

2. Conductors shall be provided for all devices, suitably sized for the intended purpose. Conductors installed in raceways shall be single conductor type THHN/THWN or equal to be approved by the Engineer and the utility. Armored cable, Type AC, metal-clad cable, Type MC or power and control tray cable, Type TC shall also be permitted.

3. Raceways where used shall be suitably sized for the conductors. Raceways shall be rigid metallic type.

4. Aerially routed cables shall be messenger supported from solid wood poles or other recognized means. Messenger shall be high strength galvanized steel.

5. Poles shall have a class suitable for the installation in accordance with the National Electrical Safety Code and the utility and shall be thirty feet length minimum. Poles shall be guyed at angle or corner runs and when eccentrically loaded.

C. Lighting Fixtures and Devices

1. Receptacles (GFI type) shall be grounded type, 120 volt, 20 ampere suitable for hand tools such as drills, hammers and grinders.
2. All temporary lighting shall use high-efficacy lamps in compliance with NYC Local Law 18 of 2014, as specified below:
   a. 60 lumens per watt for lamps over 40 watts;
   b. 50 lumens per watt for lamps over 15 watts but less than or equal to 40 watts; and
   c. 40 lumens per watt for lamps 15 watts or less.
3. General lighting lamps shall be LED equivalent to 100 watt installed in suitable lamp holders. Security lighting lamps shall be LED equivalent to 400 watt high-pressure sodium installed within a floodlight type fixture suitable to illuminate the intended area.
4. Switches, breakers and miscellaneous equipment shall be suitable for the intended purpose, with voltage, current and short circuit interrupting ratings as required for the circuits.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Grounding

1. The temporary systems shall be grounded in accordance with the requirements of Section 26 05 27 – Grounding.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Temporary wiring systems shall be installed without interfering with the work of other contractors.

B. The ground grid cable shall be installed in loop fashion completely around and outside the service point fence. The fence and distribution equipment shall be connected to the grid at a minimum of two locations.

C. The temporary general lighting system shall be installed progressively in structures as the designated areas are enclosed or as lighting becomes necessary because of partial enclosure. Lamps shall be installed to provide an even distribution of illumination over the work areas.

D. Receptacles shall be installed in such a manner so as to reach any point in the work areas with an extension cord not to exceed 40 feet in length.

E. Security lighting shall be installed on poles to illuminate the staging and parking areas.

F. Aerial conductors shall be installed at a minimum height of 14 feet above finished grade. When conductors cannot be routed at the proper height or where it will interfere with plant operations or construction activities, conductors shall be provided in rigid steel conduit and installed underground.

3.03 FIELD TESTING / QUALITY CONTROL

A. Operation

1. The Contractor shall keep the temporary power and lighting system alive each working day during Normal Project Working Hours as described in Section 01 14 00 – Work Restrictions for the duration of the Contract. This requirement includes provision of one electrician available on-call at all times for incidental modifications of the temporary electrical system as directed by the Engineer or to maintain the electrical equipment and power distribution systems at the site. Areas of the Work designated by the Engineer as requiring the use of the temporary electrical system to function outside of the above hours shall be energized continuously or as directed by the Engineer. These areas include security lighting and the Engineer's trailer complex.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Maintenance

1. The temporary electrical system shall be maintained and repaired until it is no longer required.

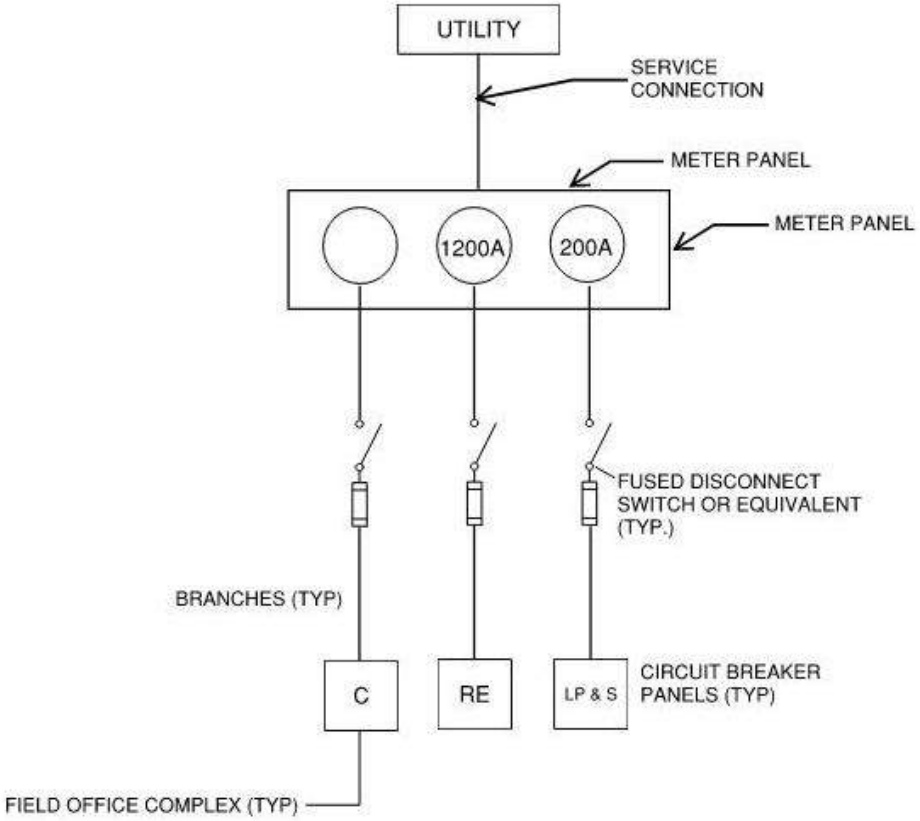
2. Lamps, fuses and other equipment shall be repaired and/or replaced, as required.

B. Removal

1. At the conclusion of the work, when directed by the Engineer, the temporary system shall be removed by the Contractor in its entirety. The ground surfaces and structures disturbed by the work shall be restored to their original condition.

END OF SECTION

SCHEMATIC DIAGRAM FOR TEMPORARY ELECTRICAL SYSTEM ARRANGEMENT



TEMPORARY POWER SKETCH

RE - RESIDENT (CM) ENGINEER COMPLEX (COMPLEX INCLUDES FIVE TRAILERS COMBINED TOGETHER AND WILL INCLUDE MULTIPLE PANELS)
C - CONTRACTOR OFFICE COMPLEX (SERVICE AS REQUIRED BY CONTRACTOR)
LP&S - LIGHTING POWER AND SECURITY

NO TEXT ON THIS PAGE

SECTION 01 52 10 – TEMPORARY FIELD OFFICE TRAILERS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Field Office Trailers

B. Security Systems

C. Office Furniture

D. Kitchen

E. Bathroom Items

F. Attachments

1. Table 1 – Office Furniture

2. Table 2 – Kitchen Items

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Installation	10
3.03	Field Testing / Quality Control	12
3.04	Startup / Demonstration	12
3.05	Adjusting / Protection / Cleanup	12

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 51 11 – Temporary Water and Sanitary Services

B. Section 01 51 30 – Temporary Electrical System

C. Section 01 52 40 – Field Office Equipment and Supplies

D. Section 01 74 20 – Construction Waste Management

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Temporary Engineer's Field Offices as specified herein.

B. Contractor's Field Office

1. The Contractor shall furnish and maintain a field office at Gate 19 (NYS Route 30 and NYC Road, Gilboa, NY 12076) in accordance with the requirements of the General Conditions, Article titled "Temporary Structures". Field offices shall be located in the areas designated in the Contract Documents or as directed by the Engineer.

C. Land for Contractor's Use During Construction

1. The Contractor shall confine its construction activities to the Site as shown on the Drawings. Limited space will be made available on the site for construction staging and field offices for the Contractor. Space must be used by the Contractor, as required in the Contract Documents or as directed by the Engineer.

2. The Contractor may require additional space for construction staging beyond the limited space available at the site. As such, the Contractor shall provide for space off-site at no additional cost to the City.

3. The Contractor may be required to move its field office during construction in order to sequence the Work. All such moving costs shall be included in the lump sum price bid for the Contract.

4. The City reserves the option to require the Contractor to vacate any part of the land assigned for Contractor's use, including the Contractor's field office area, within sixty (60) days after notice by the City.

5. The Contractor's field office shall present a clean and neat exterior appearance and shall be in a state of good repair. Temporary construction facilities, which, in the opinion of the Engineer, require exterior painting or maintenance, shall be repaired or replaced at the Engineer's direction.

6. Following the completion of the Contract, or as directed by the Engineer, the Contractor shall remove its plant, shanties, trailers, materials,

equipment, etc., from the site and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit for approval the following information:

1. Description of Resident Engineer's Field Office, including the street address and a listing of the office space (in square feet) by room.

2. Plan drawing of the Resident Engineer's Field Office, drawn to scale, indicating the Contractor's designed layout of all specified furniture and equipment.

a. Contractor shall provide interior design of Resident Engineer's Field Office suitable for accommodating 8 full-time individuals while performing construction management and inspection duties.

3. Data sheets for all products to be furnished under this Section.

4. Calculations to confirm that the design of the field office trailers was based on consideration of appropriate loads and is in conformance with all applicable codes. Such calculations shall be signed and sealed by a professional engineer licensed in New York State.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Temporary Field Offices shall be as manufactured by:

1. Williams Scotsman, Inc., Baltimore, MD;

2. Design Space International, Bala-Cynwyd, PA;

3. Nadler Modular Structures, Spring Valley, NY;

4. or approved equal.

B. Office Furniture shall be as manufactured by:
   1. Hon Co., Newark, NJ;
   2. Cole Business Furniture Co., New York, NY;
   3. Or approved equal.

C. Ceiling mounted exhaust fan shall be manufactured by:
   1. Nutone Corp., Cincinnati, OH;
   2. Broan Co., Racine, WI;
   3. Or approved equal.

D. Office Chairs shall be manufactured by:
   1. Nightingale, Mississauga, Ontario, Canada;
   2. Herman Miller, Zeeland, MI;
   3. Steelcase, Grand Rapids, MI;
   4. Exemplis, Chicago, IL.

E. Water Filter shall be manufactured by:
   1. Aqua-Pure, Davisburg, MI;
   2. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Field Office Trailers
   1. The Field Office Trailers shall be office type, new, pre-fabricated structure or a new mobile trailer.
      a. Provide a minimum of 1,200 square feet (SF) plus kitchen area and common/meeting space as approved by DEP.
      b. The kitchen should have a fridge, a microwave, a coffee machine, a water filtration system, a sink, and have enough room for supplies preferably to be about 8’x6’ to be approved by the Engineer.
      c. The Meeting room shall accommodate a 10 person table, chairs, a teleconference machine as well as adequate circulation area to be approved by the Engineer.
   2. Materials
      a. Exterior metal fully insulated walls and roof with a minimum of R-25 insulation.
      b. Interior walls insulated with R-11 insulation for sound attenuation.
      c. Ceiling height shall be 8 feet.

d. Completely weatherproofed and insulated.

e. Floor systems designed for 225 psf in addition to dead load.

f. Roof system designed for 40 psf in addition to dead load.

g. Exterior doors fully insulated (whole-unit U-factor less than 0.32, greater than R-3.0) metal type with, aluminum thresholds, heavy-duty closers and vandal-proof locksets with keys meeting building code requirements.

h. Low VOC Paints and sealants and floor coverings

i. Exterior walls and roof finished with a high SRI material, minimum reflectivity of 0.65.

j. Interior doors solid wood with lock sets.

k. High-Performance Windows with a whole-unit U-factor less than 0.32 (greater than R-3.0)

l. Windows provided with adjustable blinds, operable sashes, screens, storm sashes and all hardware such as that required for security.

m. Underside of trailers completely sealed and insulated with minimum of R-19 insulation.

n. Resilient floor coverings with a minimum 20% recycled material content.

o. Passive solar window awnings on South-facing and West-facing windows.

p. ADA compliant non-slip ramp and walkway with canopy and handrails for the main entrance.

3. HVAC

a. Ducted system with ducts concealed above the finish ceiling.

b. Sized to maintain the temperature in each room at 70 degrees Fahrenheit (F) when the outside temperature is 0 degrees F and 75 degrees F when the outside temperature is 100 degrees F.

c. Wall mounted heat/cool programmable thermostat.

d. Provide 40-gallon hot water heater.

e. Toilet rooms have a switchable ceiling mounted exhaust fan.

1) The fan shall be an 8-inch fan.

f. Fire suppression system for all rooms.

4. Electrical

a. The Electrical system shall have capacity for all loads, and be an armored cable system.

b. General interior lighting shall be light-emitting diodes with occupant or sensors.

1) Lighting shall be provided by light-emitting diode ceiling fixtures furnishing 100 foot-candle at desk height, uniform throughout. Each room shall be provided with a wall switch for ceiling fixtures.

c. Emergency lights provided as required by code.

d. Receptacles provided as required by code.

e. Trailer and electrical system to be grounded.

f. Work shall be in accordance with Section 01 51 30 – Temporary Electrical System.

5. Plumbing

a. Plumbing work is to include all water supply, drainage and piping required for a complete system. Work shall be in accordance with Section 01 51 11 – Temporary Water and Sanitary Services.

b. All soil, waste, vent and drainage piping shall be provided and connected to the sewer system.

c. Toilets to be low flush (1.28 gpf) or dual flush (1.6 gpf/0.8 gpf.)

d. Urinals to be low flush (0.5 gpf) or waterless

e. Or Portable Toilets as per Section 01 51 11 – Temporary Water and Sanitary Services.

f. Sinks to be provided with hot and cold water.

g. Water lines to be installed on the interior to prevent freezing and be concealed wherever possible.

h. One (1) exterior water faucet shall be installed at each trailer location.

i. Pipes subject to freezing shall be heat traced.

6. Room Areas for New Field Office Trailers: The room descriptions are solely for the purposes of indicating the intended use for the office/contractor supplier, and are not a binding use for the DEP.

a. Small Conference Room 15’ x 15’

b. One (1) inspector bathroom or Portable Toilet for Both Genders

c. Room for Field Gear 8’ x 8’

d. Unspecified occupant room 10’ x 10’

e. Kitchen 8’ x 6’

7. Parking: A minimum of ten (10) parking spaces shall be provided at the new Engineer's Field Office Complex for the exclusive use of the Engineer.

B. Security Systems

1. The trailer(s) shall be provided with approved Fire, Panic, and Intrusion alarm systems. The alarm system shall be connected via the telephone service in the trailer to an approved central monitoring station so that continuous monitoring will be in effect.

a. Fire Alarm System. In each of the smaller offices, heat detectors rated at 135 degrees F shall be located in the ceiling and as close to the middle of the room as possible. The larger office(s) shall have a single unit that will detect both heat and smoke. The fire system shall be wired directly to a central control panel. Upon activation of the fire system, sirens with a steady tone will sound the fire alert. All sirens will automatically shut down and re-arm after fifteen minutes.

b. Intrusion and Panic Alarm System. Each opening (doors and windows) shall be protected so that if they are opened while the system is activated, an alarm condition will result. Upon activation of the intrusion system, sirens with a modulating tone will sound an alert. All sirens will automatically shut down and re-arm after ten minutes.

1) Panic alarm units shall be installed in two locations as designated by the Engineer. When this system is activated, there will not be a siren response; this system will be activated in the silent mode.

2) A remote tamper proof turn off switch shall be installed on the outside of the trailer at a location designated by the Engineer so that the intrusion system can be shut down before entering the field office. The remote turn off switch shall not affect the fire or panic system; turn off switches for these systems shall be located as directed by the Engineer. The intrusion and panic system shall be connected to the central control panel located in the City's field office trailer.

c. Control Equipment

1) All wiring shall be to be current standards being used in the alarm industry and, where possible, all wires shall be hidden.

2) All contacts shall be recessed and moisture proof.

3) The single unit smoke and heat detectors shall be of a photoelectric type that provide quick response to flaming and smoldering fires and designed to permit

easy entry of smoke from any direction. The heat detector portion of this unit shall be activated at 135 degrees F. The combined unit will also have a LED pulse located on the face of the unit to indicate that power is on. No radioactive materials will be permitted in this fire alarm sensor.

4) An 8-ohm siren will be provided. The siren will be installed in a tamper proof steel siren box located on the exterior of the trailer at least 10 feet above the top of the trailer roof.

a) The external siren shall be of 30-watt capacity with two separate and distinct alarm signals for both warble and continuous tone selections so as to differentiate between fire and burglar alarm. It shall be Ademco Model No. 715 "Blaster" electronic siren in tamper proof cabinet or approved equal. There shall be an amber strobe light attached on or adjacent to the siren box, wired so that it is activated when the siren is activated.

b) The outside wiring shall be installed in protective seal conduit.

5) Control panel shall be provided and installed in the field office trailer. The control panel shall be equipped with at least three channels - one for fire, second for intrusion and third for panic. The control panel shall also have DC batteries that will supply back-up power in the event that AC power is interrupted. Each channel of the control panel will be wired directly to a digital communicator. The control panel shall have one delay entrance exit channel. The control panel and system shall be a 12-volt system.

a) The control panel shall have indicating lights that indicate the mode of the:

(1) Protective circuit

(2) Alarm memory

(3) AC power on

(4) Armed and a switch for bell/battery test and fire reset

6) The digital communicator shall be provided furnished and installed adjacent to the control panel in the field office trailer. It shall be of a type that will notify the

approved central station of the specific alarm condition (fire, intrusion, or panic). The digital communicator will also inform the approved central station of low power on the system. The Contractor shall arrange through the New York Telephone Company for the necessary interconnect equipment so that the digital communicator may be connected to the telephone service at the field office trailer. The connection of the New York Telephone Company shall have line seizure so that the outgoing signal from the digital communicator cannot be interrupted. The current standards used by approved central station regarding "call back to verify" alarm conditions shall be employed.

a) The Contractor shall provide a minimum of four external floodlights to illuminate the Engineer's trailer and surrounding walkways. They shall be activated by a photoelectric unit with a backup timer.

7) The Contractor shall provide and install a complete security system as outlined above. All costs, including connection to the New York Telephone Company, central station monitoring and repair and maintenance charges shall be borne by the Contractor; the costs thereof shall be included in lump sum price bid for the Contract.

C. Office Furniture

1. All furnishings and equipment shall be provided new and unused. All furnished equipment shall be periodically provided with consumable ancillary supplies such as: toner, cartridges, paper and with maintenance / repair and servicing contracts for the entire duration of the Contract. The maintenance response time shall be not more than 24 hours from the time of notification.

2. Office furniture must comply with “Mayoral Directive No.1-91 Procurement and Ergonomic Standards for Video Display Terminals and Ancillary Furniture and Equipment” dated January 25, 1991.

3. Furnish and install office furniture as shown in Table 1, attached, and as directed by the Engineer.

D. Kitchen

1. The kitchen shall be provided with items as shown in Table 2, attached.

2. Sink and refrigerator as manufactured by the Acme National Refrigeration Co., Inc., 19-26 Hazen Street, Astoria, NY, Model No. RESY6y-30; or by

the King Refrigerator Corp., 76-02 Woodhaven Blvd., Glendale, NY, Model No. K30Bs or an approved equal. It shall be installed where directed complete with plumbing, sanitary, and electrical connections. The unit shall have an under-the-counter water filter with test/odor cartridge. Filter must be changed per manufacturer's recommendations. The Contractor shall furnish all labor, materials, tools, and equipment necessary for furnishing, installing, connecting, testing, and placing into satisfactory operation, a cold water, under counter filter which utilizes its own spout. The Filter shall be an Aqua-Pure AP - 200, with the Aqua-Pure AP 217 taste/odor cartridge, or approved equal, and conform and be listed under NSF Standard 42 (Class II). The replacement cartridges for the AP-217 are to be supplied and delivered as directed by the Engineer.

E. Bathrooms

1. The bathrooms shall be properly ventilated and shall be equipped with the following:

a. The bathroom shall be equipped with a flush toilet with elongated bowl, a washbasin with two faucets, a medicine cabinet complete with supplies approved as equal to Hospital Supply and Watters Laboratories, Inc., Model No. 1, and a roll toilet tissue holder.

b. A power exhaust fan shall be installed in the ceiling of the washroom. The fan shall be an 8-inch fan as manufactured by Nutone Corp., Cincinnati, OH, or Model No. 4C210 by Broan Co., Racine, WI or approved equal.

c. Plumbing and fixtures shall be approved house type. Each appliance shall be trapped and vented. Engineer's Field Office trailers shall have a single discharge connection.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Resident Engineer's field office shall be ready for operation within sixty (60) ccd after the issuance of the Notice to Commence Work and, thereeafter, shall be continuously available for the use of the Engineer for the duration of the Work.

3.02 INSTALLATION

A. General

1. The Contractor shall, as specified and approved in accordance with the requirements of all appropriate laws, ordinances, and regulations, furnish, install, equip, maintain, and service the Resident Engineer's Field Offices.
2. The Contractor shall obtain and pay for all permits.
3. The Contractor shall be fully responsible for providing and securing all necessary permits and approvals associated with potable water and sewage services for the Resident Engineer's Field Offices as well as the Contractor's Field Offices as described in this section.
4. Each office shall be complete with electrical and plumbing hook-ups to be available during the construction period for the exclusive use of the Resident Engineer. The trailers shall be installed at the sites at locations specified by the Engineer. All built-in movable equipment including, but not limited to: fire alarm system, new telephone system, computer system, security system, and portable bi-directional communicator shall be installed and made operable and ready for use by the Resident Engineer.
5. Concrete block foundation walls shall be constructed as directed. The walls and footings shall completely enclose the bottom of each trailer. A platform with ramp and handrails shall be provided adjacent to each entranceway. The site of the trailer shall be graded as directed by the Engineer.
6. All exterior items not factory painted shall be painted by the Contractor as directed by the Engineer.

B. Office Space

1. The floor space as stated herein and shall be a weatherproof and thermally insulated structure, and have separate and adequate means for easy and safe entry and egress. It shall have a sufficient number of windows to permit convenient use for engineering office work, as is appropriate, in normal daylight without the use of artificial light. The office shall be partitioned and furnished as specified herein. Install a fire, intrusion, and panic alarm system.

C. Electrical Installations:

1. The trailer and electrical system therein shall be properly grounded by the Contractor. The Contractor shall provide extended electrical service as required to service all equipment in the trailer and as indicated above. All electrical energy costs for the offices will be borne by the Contractor.

D. Heating and Air Conditioning Installations:

1. The Contractor shall place in operation and maintain the heating and air conditioning units. The system shall be maintained and repaired and kept in good operating condition during the performance of the Work. The HVAC system shall be serviced for maintenance 2 times per year at a minimum.

E. Contractor's Field Office

1. Trailers utilized by the Contractors shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Engineer, require exterior painting or maintenance will not be allowed on the site.

2. The Contractor's Field Trailer shall be equipped with heating ventilation and air conditioning, suitable fluorescent lighting, potable water and sanitary connections, steel security mesh protection for each window, exterior security lighting, steps with railing to the trailer door and a security alarm to detect intrusion at each exterior window and door. The Contractor shall be responsible for all costs associated with providing these services.

3. The Contractor shall obtain 120/208 volt electrical service for the trailer and necessary outdoor lighting from a panelboard on-site to be identified by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Field Office Trailer Maintenance

1. The finishing of floors and the painting of exterior and interior surfaces of the field offices shall be as approved by the Engineer.

2. Keep the offices in first class condition during the occupancy by the Engineer and until the completion of all work under the Contract. Promptly replace any damaged or defective parts, including appliances, fixtures, computers and equipment.

3. Janitor Service: Provide full, daily janitorial services for all the offices, including, but not limited to, sweeping, mopping, vacuuming, dusting and garbage removal. The office floors shall be swept daily, and washed at least once per week. The bathroom shall be swept and mopped daily and the water closet, sink and shower shall be cleaned and disinfected daily. Furnish, replace and replenish electric light bulbs and fluorescent tubes, toilet paper, cloth and paper towels, soap, and all other items required to maintain the offices in clean and perfect condition. Windows shall be washed at least once every month. Hang, remove, and store window screens, storm windows, and screen and storm doors when ordered. All maintenance work shall be performed during normal working hours.

4. Furnish fuel and provide service for the heating, cooling and hot water systems, as required, to provide the specified heat, cooling and hot water.

5. Provide for the satisfactory disposal of sanitary and other wastes.

6. Exterminate the premises as necessary to control insect and rodent infestation.

7. General outside maintenance including collection and removal of miscellaneous litter and debris in parking areas and grass cutting as required by Resident Engineer.

8. Keep the access roads, parking areas, and walks about the field office buildings free and clear of snow and ice.

B. Trailer Removal

1. The Contractor shall remove and dispose of the temporary field office trailer at the end of Contract in accordance with Section 01 74 20 – Construction Waste Management.

END OF SECTION

TABLE 1
OFFICE FURNITURE

Description	Quantity
Book cases, 41 inches high by 36 inches wide by 13 inches deep	Six (6)
55-gallon trash bin	One (1)
55-gallon paper recycling bin	One (1)
55-gallon metal/plastic recycling bin	One (1)
Dry chemical fire extinguishers, UL listed 1A-10BC	Two (2)
Office desks Table Top Width: 60-inches Table Top Depth: 30-inches Drawers: One (1) box drawer, One (1) deep file drawer, One (1) center drawer and locks. Under Table Top: Width: 20 – 24 inches Depth at knee Minimum: 15 inches Depth at toe minimum: 23.5 inches Height to top of keyboard support surface: Adjustability includes 23 – 28 inches Display surface height: Allow viewing angle of 5-30 degrees to center screen	Six (6)
48” x 72” conference tables	Two (2)
Armless side chairs (stackable)	Ten (10)
File cabinets, four (4) drawer, legal size	Five (5)
Wastebaskets	Eight (8)
Storage cabinet, lockable, 72” high by 36” wide by 18” deep	One (1)
Fire extinguishers, type B:C	Four (4)
Telephone answering machine, beeperless remote	One (1)
First aid kit	One (1)

TABLE 2
KITCHEN ITEMS

Description	Quantity
Wood kitchen cabinets with Formica counter tops	15 linear feet
Electric bottle-less water filtration system with hot and cold outlets Model: Aqua-Pure AP - 200, with the Aqua-Pure AP 217 taste/odor cartridge	One (1)
Microwave oven, 2.0 cubic feet	One (1)
Automatic drip coffee maker	One (1)
Refrigerator, 25 cubic feet	One (1)
Overhead kitchen cabinets	One (1)
Tables, 60 inches long by 30 inches wide	One (1)

SECTION 01 52 40 – FIELD OFFICE EQUIPMENT AND SUPPLIES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish and install field office equipment and supplies, complete and operational.

1. The Contractor shall also provide servicing of the resident engineer's field office.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Data sheets for all office equipment, supplies and services to be provided under this Section including but not limited to the following:

1) Network

2) Printers and Copying Machines

3) Telephones and Facsimile Machines

4) Internet Service.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Combination Copy, Printer, and Scanner Machine: Provide the latest model copy machine from the following brands that meets the requirements specified herein:

1. Work Center 7835 as manufactured by Xerox® Corp.

2. Or approved equal.

B. Facsimile Machine:

1. Laser Fax, Model KX-FL511 as manufactured by Panasonic Corp.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Provide all furnishings and equipment specified herein new and unused.

B. All equipment furnished under this Section shall be provided with, at a minimum, the following consumable and ancillary supplies for duration of the Contract:

1. Toner cartridges.

2. Paper.

3. Maintenance / repair service contracts.

a. The Contractor shall provide a service and repair contract via the local representative of the equipment dealer or manufacturer.

b. The service contract shall be for on-call, on-site service during normal business hours.

c. The maintenance response time shall be not more than 24 hours from the time of notification.

C. Provide the following office equipment:

1. The Contractor shall install a LAN System:

a. All cable, conduit, and equipment (installed) necessary to provide a LAN interface from each computer station and the printer.

b. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

c. Provide managed Ethernet switch with sufficient ports for the office equipment specified herein. Power over Ethernet is acceptable for wireless access points and other devices.

d. Provide a sufficient number of 802.3at Wi-Fi access points to provide the following minimum level of service to the entirety of the field office:

1) 1300Mbps at 5 GHz

2) 450Mbps at 2.4GHz

e. The Contractor shall be responsible for providing all appurtenances necessary to connect the managed Ethernet switch to the internet service provider, including underground installation of internet service.

f. Provide cable or fiber optic internet service of 100 MBps speed minimum. Satellite internet service providers are not acceptable.

2. Combination Copy, Scanner, and Printer Machines: The Contractor shall provide two (2) combination copy, scanner, and printer machines.

a. Machines shall be automatic feed type, compatible with the computers.

b. Machines shall operate off the LAN with 10/100 Ethernet Connectivity at a minimum.

c. Machines shall be capable of printing 8½-in. by 11-in., 8½-in. by 14, and 11-in. by 17-in. sheets.

d. Machines shall be capable of printing black and white and color at a resolution up to 1200 x 2400 dpi.

e. Machines shall also have color and black and white scanning capability.

f. Furnish all cable, conduit, and equipment necessary to provide a LAN interface from the managed Ethernet switch to the machines.

g. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

h. The machine shall be designed to produce 110,000 copies per month and shall be dust resistant.

i. Copy function shall be capable of automatically feeding 8½-in. by 11-in., 8½-in. by 14-in., and 11-in. by 17-in. originals.

j. Machine shall be capable of and copying onto plain bond paper sheets at variable magnification from 50% to 200%.

k. The machine shall have an automatic feed tray, a staple function, and an automatic copy sorter.

l. The paper tray for each size paper shall hold at least 144 sheets.

m. Machine shall be capable of scanning to TIFF and text searchable PDF. Machine shall have scan to e-mail function.

n. The Contractor shall obtain and pay for a service and repair contract with a local representative of the copy machine dealer or manufacturer for on-call daily on-Site service.

o. The Contractor shall furnish powders, cartridges, chemicals, or other materials required for proper operation of the copy machine and paper supply.

3. Telephone Service:

a. Provide six (6) VoIP Telephones.

b. Each telephone shall be a full feature push button telephone set with multiple lines and all equipment necessary for its operation.

c. All telephones will be connected to a central switchboard having a minimum of ten independent touch-tone phone service lines.

d. The phones and phone service shall be furnished and installed by the Contractor.

e. Make arrangements and bear all costs for the installation of cables and for supplying telephone service during the Contract period.

f. The telephone lines shall be separate from the facsimile line specified herein.

4. Facsimile Machine:

a. Provide one (1) facsimile machine to be installed on an independent touch-tone VoIP service line.

b. Provide a service contract and all necessary supplies (toner, paper, etc.) for the system for the duration of the Contract.

D. Office Supplies:

1. The Contractor shall furnish all office supplies required by the Engineer and his staff during the course of construction.

2. Items shall include but not be limited to note pads, pens, pencils, paper clips, rubber bands, labels, manila folders, envelopes, erasers, hanging folders for filing cabinets, ink pads, etc. and all ancillary supplies necessary to operate the facsimile and copy machine.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Resident Engineer's field office shall be completely equipped with office equipment and supplies required under this Section and ready for operations within sixty (60) ccd after the issuance of the Notice to Commence Work and, thereafter, shall be continuously available for the use of the Engineer for the duration of the Work.

3.02 IMPLEMENTATION

A. Maintenance of Equipment and Services:

1. Maintain and repair all office equipment and furnishings in first class condition for continuous operation.

2. Telephone, Facsimile, and Internet service:

a. Provide telephone and fax service, including all calling charges for the Resident Engineer's field offices, for the duration of the Contract.

b. Provide internet service (cable or fiber optic – satellite is not acceptable) in order to adequately service the offices.

c. Provide separate lines for telephone service, alarm monitoring, and facsimile systems.

d. Install all telephone cables required for supplying telephone service.

e. The Contractor shall pay the costs for installation of the telephone cables and for supplying and maintaining telephone, alarm monitoring, facsimile, and internet service.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Removal of Equipment:

1. At the completion of all Work and as directed by the Engineer, the Contractor shall remove and dispose supplied equipment which shall become the property of the Contractor.

2. The Contractor shall have all services disconnected and capped to the satisfaction of the Engineer.

END OF SECTION

SECTION 01 52 50 – TEMPORARY GUARD BOOTHS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Guard Booths

B. Guard Booth Installation

C. Disposition of Guard Booths and Equipment

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Guard Booths

1. The Contractor shall maintain security guard booths at locations shown and as directed by the Engineer.

2. The guard booths shall be kept fully equipped and ready for the Engineer's use.

   a. The Contractor shall provide a licensed electrical contractor to maintain electrical power supply.

   b. The Contractor shall obtain and pay for all permits.

3. Security guard booths shall be 4 feet long and 4 feet wide, overall. These shall meet the following minimum requirements:

   a. The exterior of the guard booth shall be given an approved prime coat of paint followed by one coat of approved exterior enamel. The enamel finish coat shall be DuPont Lacquer, or an approved equal, color to be furnished upon award of Contract.

   b. The underside of the guard booth shall be blocked or skirted as necessary to prevent debris from accumulating underneath.

   c. All windows and doors shall have aluminum screens. All windows that are not fixed shall be covered on the exterior with an expanded metal screen covering the full window area. The Plexiglas shall be secured by means of carriage bolts through the wall with nuts fastened from the interior.

   d. Interior shall be finished in 1/4-inch plywood. Plywood shall be finished in natural color, with two (2) coats of varnish or lacquer.

   e. The heating system shall consist of thermostatically controlled built-in electrical baseboard heaters capable of maintaining 70 degrees F temperature in all rooms even with exterior air temperature being 0 degrees F.

   f. The air conditioning system shall be capable of maintaining a temperature of 75 degrees F in all rooms when the exterior air temperature reaches 95 degrees F. All air conditioning units shall have E.E.R. rating in excess of 9.9.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit for prior approval the following information:

1. Plan drawing of the temporary guard booth, drawn to scale, indicating the Contractor’s designed layout of all specified furniture and equipment.

2. Data sheets for all products to be furnished under this Section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not used.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

3.02 IMPLEMENTATION

A. Guard Booth Installation

1. If additional guard booths are required, they shall be installed at locations as directed by the Engineer.

a. Concrete block foundation walls shall be constructed as directed. The walls shall completely enclose the bottom of the Guard booths.

2. All exterior items not factory painted shall be painted by the Contractor as directed by the Engineer.

B. Services for Guard Booths

1. Electrical Service

a. The Contractor shall contract with a licensed electrical contractor to provide sufficient capacity in the temporary lighting and power system to furnish ample power for each guard booth.

b. Electric service shall be 120/208 volts, 3 phase, 60 hertz and of adequate capacity for all needs. Electrical service and all associated electrical needs shall be provided by the Contractor. The electrical

installation shall conform to the requirements of the City of New York Electrical Code and the Bureau of Electrical Control. The Contractor shall pay all costs of supplying energy and maintaining service.

2. Telephone Service

a. The Contractor shall pay all costs for supplying telephone service for calls.

b. Telephone service for the guard booths shall be brought from the nearest existing telephone manhole. The Contractor shall make the arrangements for service with the local telephone company approved by the Engineer and shall conform to the telephone company's requirements.

c. Telephone service for the security guard booths shall include one line for the telephone.

d. Landline telephone service to each security guard booth remains from prior construction contracts and shall be taken over by the Contractor.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Disposition of Guard Booths and Equipment

1. At the completion of all Work, all guard booths shall become the property of the Contractor.

2. At the completion of all Work, all moveable equipment purchased under this Contract shall be relocated to a location within a 50-mile radius to be determined by the Engineer.

B. Following the completion of the Contract or as indicated on the Contract Documents or directed by the Engineer, the Contractor shall remove his field offices, materials, equipment, etc., from the allocated site and restore the site to its original condition, satisfactory to the Engineer.

END OF SECTION

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Maintenance of Traffic
2. Site access
3. Truck routes
4. Construction staff parking area
5. Contractor employees' parking area

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 55 26 – Traffic Control

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Maintenance of Traffic

1. The Contractor shall be responsible for maintenance and control of traffic in and out of the Site and at all points of vehicular ingress and egress affected by the Work.

2. All maintenance and protection of traffic shall be done in accordance with Section 01 55 26 – Traffic Control, this Contract.

3. Construction-related vehicles and activities shall not impede or otherwise adversely affect the flow of regular traffic traveling on the roads leading to and adjacent to the Work location.

4. Construction-related vehicles and activities shall be understood as including vehicles operated and activities undertaken by the Contractor (including its employees, Subcontractors and visitors). Regular traffic shall be understood as referring to all vehicles other than construction- related vehicles.

5. The Contractor shall ensure that construction-related trucks entering the work area do not queue on or along public roads. Queuing areas for all trucks entering or exiting the Site shall be limited to the areas of disturbance. Compliance with the restriction against the queuing of trucks on or along public roads shall be understood to be a material provision of this Contract.

6. The Contractor shall perform the Work required in this Contract in accordance with applicable traffic and safety rules, regulations, ordinances, and permit conditions.

7. The Contractor shall be responsible for obtaining and paying for approvals required to modify existing streets and/or traffic patterns whenever the construction operations require modifications to the existing streets or traffic patterns. Traffic safety devices shall be placed as per the Manual of Uniform Traffic Control Devices (MUTCD).

8. When equipment delivered under this Contract is transported as an "oversized load", the Contractor shall maintain traffic in accordance with the requirements of the various federal, State, City, and local agencies having jurisdiction.

9. During the progress of the Work, the Contractor shall provide all temporary construction roads and walkways as required, and shall make ample provisions to prevent interference with the continued maintenance of vehicular traffic on roadways. Any roadways damaged by the Contractor

or his/her Subcontractors or materialmen shall be restored to their original condition upon notification by the Engineer that such repairs are required. Such restoration of the roadway shall be at the Contractor's expense. Temporary walkways shall be removed, at the Contractor's expense, prior to acceptance of the Contract.

B. Site Access

1. Access to the Site shall be at locations designated by the Engineer and is subject to change during the progress of the Project.

2. The Contractor shall provide traffic control signage and flag persons as required to ensure access to the Site for the use of all Subcontractors, suppliers and other traffic required for the expeditious completion of the work in accordance with Section 01 55 26 – Traffic Control.

C. Truck Routes

1. During the progress of construction, trucks entering or leaving the site shall utilize only NYSDOT-designated and DEP-directed or approved truck routes. The Contractor shall ensure that its crew members, and its Subcontractors and materialmen and their crew members are fully advised of the designated and directed or approved routes.

2. NYSDOT truck routes are identified on the New York State Truck Route map.

3. Notwithstanding the foregoing or any other Contract provision, the Contractor understands and expressly consents that the DEP has the right and authority at all times, in the discretion of the Commissioner and/or the Engineer, to require and/or direct alterations, revisions and/or amendments in or to trucking and transportation plans, procedures and any related protocols. The Contractor further agrees that such right and authority includes the right to designate, alter revise and/or amend any such plans procedures and/or protocols including (without limitation of any kind) the truck and tractor-trailer routes to be utilized by the Contractor and all subcontractors and materialmen to and from the Site, and including usage of local streets, and interstate, federal, state and/or local highways. No such designation, alteration, revision or amendment shall be deemed a Contract change entitling the Contractor to claim additional compensation unless the designation, alteration, revision or amendment relates to a change in routing.

D. Construction Staff Parking Area

1. The parking area identified on the Contract Drawings is limited. The area shall be utilized solely by the Construction Management staff and visitors to the Construction Management Office.

2. The Contractor shall take appropriate actions to ensure that no personal vehicles of its employees, or employees of its Subcontractors or materialmen will be permitted on the Site.

E. Contractor Employees' Parking Area

1. The Contractor Employees Parking Area(s) shall be adequately sized, and shall be provided for and maintained by the Contractor at its sole expense. Contractor agrees that the City shall have no obligation to assist in obtaining nor to make available publicly-owned property for such purposes. It is a contractual requirement that the Contractor implement and enforce this policy, and that the Contractor take any necessary or appropriate actions to ensure compliance with such parking policy by its and its Subcontractors' employees. The Contractor agrees to make appropriate efforts to encourage the use of public transportation and the practice of car-pooling by all such employees.

2. The Contractor shall issue parking badges or stickers to such employees for their personal vehicles, in such form and with such associated documentation as the Engineer may approve, require or modify.

3. The parking badges or stickers shall be displayed in a prominent location upon each employee's vehicle, as may be approved, required or modified by the Engineer.

4. The Contractor Employees Parking Area(s) shall be of a size and situated in an off-site location(s) acceptable to the Engineer, and unless otherwise authorized by the Engineer, within 0.5 miles of the Site.

5. The Contractor shall be responsible for the safe and efficient movement of employees between the Contractor Employees Parking Area and the Contractor's Work area.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall maintain and/or redirect both vehicular and pedestrian traffic and protect the public from all damage to person and property, within the limits of and for the duration of the Contract. Traffic shall be maintained over a smooth traveled way, as approved by the Engineer, which shall be so marked by signs, delineation and/or other methods that a person who has no knowledge of conditions can ride, drive or walk over all or any portion of the highway under construction where traffic is to be maintained.

B. The Contractor is placed on notice that the maintenance and protection of traffic during construction is considered as important and necessary as an item of Work as is the actual construction itself. The Contractor shall at all times conduct the operation in a manner to ensure the safety of motorists, pedestrians and employees.

C. All Work performed and materials furnished under this provision shall be in strict conformity with the Contract Drawings, the Specifications, the final approved Maintenance and Protection of Traffic Plan (MPT Plan) and Schedule of Operations for the Maintenance and Protection of Traffic, and subsequent modifications or amendments thereto approved by the Engineer and agencies and departments having jurisdiction. If, in the opinion of the Engineer, maintenance and protection of traffic is not adequate, the City may order the Work to be done by others and deduct the actual cost thereof from payments to the Contractor.

D. The Contractor shall, prior to bidding, thoroughly familiarize himself or herself with the ordinances, rules, regulations and practices of the City of New York and local authorities. The Contractor is referred to the U.S. Federal Highway Administration Manual of Uniform Traffic Control Devices (MUTCD) and the New York State Department of Transportation (NYSDOT) Supplement to the MUTCD, which shall govern wherever applicable. BEDC EHS Standard for Work Zone Traffic Control shall apply to all work of this Section. The Contractor shall, prior to commencement of work, obtain copies of all said requirements, a copy of which shall be given to the Engineer.

E. As required, the Contractor shall provide all traffic control devices necessary to protect traffic at designated work zones. Traffic control devices specified herein include temporary signs, timber curbs, timber barricades, plastic barrels, temporary chain link fence, and temporary pavement markings. Maintenance and protection of traffic shall remain in place until all proposed work is complete and fully operational in accordance with the Contract Documents.

F. Unless otherwise specified in these Contract Documents, the Contractor shall be responsible for the maintenance of the entire pavement, drainage, potable water and sewage facilities, and other street elements, both old and new, after the effective date of starting any field work and ending on the date of Final Acceptance.

G. In addition to the Work shown in the Contract Documents, the Contractor shall comply with 17 NYCRR (New York Supplement).

H. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	4
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Erection	8
3.03	Field Testing / Quality Control	14
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 56 00 – Temporary Barriers and Enclosures

C. Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control

1.04 REFERENCES

A. U.S. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD)

B. New York State Department of Transportation (NYSDOT) Supplement to the MUTCD for Streets and Highways

C. New York State Department of Transportation (NYSDOT) US Customary Standard Sheets

D. New York City Department of Transportation (NYCDOT) Standard Highway Specifications

E. New York City Department of Transportation (NYCDOT) Standard Details of Construction

F. ASTM B589 - Standard Specification for Refined Palladium

1.05 DESCRIPTION

A. Maintenance of Traffic

1. During working hours, the Contractor shall be responsible for maintenance and control of traffic in and out of the Site at all points of vehicular ingress and egress and shall provide flagmen to warn vehicles on City streets of vehicles approaching from the Site. Flagmen shall be properly attired, equipped and trained according to the regulations of the City of New York and BEDC EHS Work Zone Traffic Control Standard. All roadway closures and minimum lanes of traffic shall be in conformance with the final NYSDOT Highway Design Manual Chapter 16, Work Zone Traffic Control.

2. Modifications to existing City streets and traffic patterns shall be approved by and in accordance with the requirements of the NYSDOT Highway Design Manual. The Contractor shall be responsible for obtaining and paying for this approval whenever the Contractor’s construction operations require modifications to the existing streets or traffic patterns. Traffic safety devices shall be placed as per the MUTCD and the NYSDOT Supplement to the MUTCD.

3. When equipment delivered under this Contract is transported as an "oversized load", the Contractor shall maintain traffic in accordance with the requirements of the various State and local agencies having jurisdiction.

4. During the progress of the Work, the Contractor shall provide all temporary construction roads and walkways as required, and shall make ample provisions to prevent interference with the continued maintenance of vehicular traffic on roadways and shall indemnify and save harmless the City and the Engineer from any expense whatsoever due to the Contractor’s operations over said roadways. Any roadways damaged by the Contractor or Subcontractors or materialmen shall be restored to their original condition upon notification by the Engineer that such repairs are required. Such restoration of the roadway shall be at the Contractor's expense. Temporary walkways shall be removed, at the Contractor's expense, prior to Final Acceptance of this Contract.

5. The Contractor shall provide the minimum lane width at the various work zones as specified in the final NYSDOT Highway Design Manual or as directed by the Engineer. Vehicular traffic at driveways to adjacent

properties shall be maintained at all times, other than at the time of construction, and shall provide temporary steel road plates at all times. Temporary traffic detours shall be implemented according to the approved MPT Plan or as directed by the Engineer.

1.06 QUALITY ASSURANCE

A. Standards

1. The Contractor shall comply with the MUTCD, the NYSDOT Supplement to the MUTCD, the NYCDOT Standard Highway Specifications, BEDC EHS Standard for Work Zone Traffic Control, and all applicable Federal, State and Municipal codes including revisions to date of Contract.

B. Requirements of Regulatory Agencies

1. Prior to proceeding with construction Work, the Contractor shall submit an MPT Plan and a Schedule of Operations to the NYCDOT-OCMC, 7th Floor, 55 Water Street, New York, NY 10041, for review and approval, and for obtaining final written Traffic Stipulations. The Contractor shall adhere to any and all requirements identified in the NYCDOT-OCMC final Traffic Stipulations, and in addition the Contractor must also adhere to the following:

a. The Contractor shall be required to organize and attend a pre-construction meeting with the NYCDOT-OCMC and shall comply with all requirements issued by that agency. The Contractor shall notify both the City and the Engineer of the scheduled meeting.

b. The Contractor shall notify NYCDOT-OCMC 30 calendar days prior to the start of Work.

c. To permit finalization of traffic control measures, the Contractor, ten (10) days prior to the start of Work, shall arrange for an on-site field meeting with NYCDOT-OCMC. The Contractor shall notify both the City and the Engineer of the scheduled meeting.

d. Access must be provided for local and emergency vehicles at all times. A copy of the final NYCDOT-OCMC Traffic Stipulations shall be made available on the construction site at all times.

C. Permits

1. The Contractor shall obtain all necessary permits required by the NYSDOT. Such permits shall be maintained in effect for the entire duration of the Contract. Should the Contract time be extended, the Contractor shall obtain all necessary additional permits.

2. The Contractor shall obtain and pay for all required permits, fees and inspections by authorities having jurisdiction.

3. The Contractor shall also comply with the requirements specified in Section 01 41 00 – Regulatory Requirements.

D. Qualifications of Manufacturers

1. Products used in the Work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the applicable parts of the Contract Documents.

E. After Hour Work

1. If at any time, the Contractor is required by NYSDOT or deems it necessary to work outside the Normal Project Working Hours, as described in Section 01 14 00 – Work Restrictions, he or she shall obtain all necessary permits and shall notify DEP in advance.

1.07 SUBMITTALS

A. General

1. The Contractor shall submit Shop Drawings as specified herein, including the MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic.

2. If not included within the MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic the Contractor shall submit a list of certified flaggers identifying the training for each as required by the BEDC EHS Standard.

B. MPT Plan and Schedule of Operations

1. The Contractor, as the Work progresses, shall prepare and submit to the Engineer and any agencies and departments under which responsibility of roadways fall, an MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic, showing in complete detail the methods, sequences, procedures and facilities proposed for installation. Before the Contractor shall in any way or manner restrict or interfere with the normal flow of traffic, he or she shall first secure written approval from the agencies and departments having jurisdiction of its proposed plan. The MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic shall be prepared, signed and sealed by a Professional Engineer licensed in the State of New York.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. General

1. All temporary signs, temporary concrete barriers, fencing, delineators, barricades, lighting and other warnings and guiding devices shall be as approved by the Engineer, agencies and departments having jurisdiction, and except as otherwise specified, will remain the property of the Contractor.

B. Temporary Signs

1. All materials and the details of fabrication, erection, location, relocation, and assembly shall be per the approved MPT Plan and in accordance with the applicable rules and regulations of the New York City Bureau of Traffic Operations and the NYSDOT Supplement to the MUTCD where applicable and approved by the Engineer.

2. All signs and barricades shall conform to the NYSDOT Supplement to the MUTCD.

3. All materials for the Temporary Traffic Signals shall conform to the latest specifications and drawings on file with the New York State Department of Transportation, Traffic Operations Bureau. The Contractor or an approved Subcontractor must perform this Work.

C. Type III Breakaway Barricade

1. The Contractor shall furnish and install Type III Breakaway Barricade units as necessary or required by the Engineer.

2. Type III Breakaway Barricades shall comply with the NYSDOT Standard Specifications and NYSDOT US Customary Standard Sheet 619-02.

3. If the Contractor elects to substitute any material not listed in this Specification, he or she shall submit evidence acceptable to the NYSDOT that the proposed material is not frangible.

4. If the Contractor elects to use an alternate design, he or she shall submit Shop Drawings in accordance with Section 01 43 20 – Approval of Product Manufacturers.

D. Timber Curb

1. Timber and lumber shall be dense, structural grade Douglas Fir or Southern Yellow Pine.

2. Lag screws shall be 3/4" diameter by ten (10) inches long. Anchor spikes shall be one (1) inch diameter by not less than twenty-four (24) inches long. Splice spikes shall be 40d.

3. Striping shall be done with white and orange enamel.

4. Reflective material shall conform to the requirements of ASTM Designation B589 "Standard Specification for Refined Palladium."

E. Timber Barricades

1. Timber and lumber shall be dense, structural grade Douglas Fir or Southern Yellow Pine.

2. Reflectorizing materials shall conform to the requirements of ASTM designation B589 "Standard Specification for Refined Palladium."

3. Flashing units for each barricade shall be solar powered with battery backup, or as approved by the Engineer.

F. Plastic Barrels:

1. The Work shall include the furnishing and installing of plastic barrels, sand ballast, and flashers (for every fourth barrel). The barrels are to be placed as indicated on the plans or as directed by the Engineer. The barrels shall be maintained and replaced as required during the various stages of construction. Barrels and flashers shall be in accordance with NYSDOT US Customary Standard Sheets.

G. Temporary Construction Fencing:

1. All materials shall be in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

H. Temporary Pavement Marking Tape

1. As required, the Contractor shall provide, install and remove temporary paste-on pavement markings.

2. Pavement markings tape shall be 4-inch wide white "Flex-O-Line" as manufactured by FOL Tape, Fenton, MO., "Scotch Lane" as manufactured by 3M Company, St. Paul, MN, or approved equal.

I. Precast Concrete Median Barrier (Jersey Barrier):

1. The Contractor shall furnish and install precast concrete barriers as necessary or required by the Engineer. All materials shall be in accordance with NYSDOT Standard Highway Specifications.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Verification of Conditions

1. The Contractor shall examine the areas and conditions under which work of this Section will be installed and correct conditions detrimental to proper and timely completion of the Work. He or she shall not proceed until all unsatisfactory conditions have been corrected.

3.02 ERECTION

A. General Construction Details

1. Construction work shall be conducted in such a manner as to provide minimum interference of normal pedestrian or vehicular traffic. In some cases, it will be necessary to block walks and driveways. Prior to blocking or obstructing walks and/or driveways, the Contractor shall provide sufficient notice (48 hours) to a responsible person in each residence or commercial establishment.

2. The Contractor shall not close or obstruct any portion of a street, road or private way without first obtaining permits from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he or she shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Engineer and to the proper authorities.

3. The Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore, shall maintain streets, roads, private ways, and walks not closed passable and safe.

4. Where streets or portions of streets, now in use, are included for paving or repaving work under this Contract, the Contractor shall be responsible for the maintenance of such streets or portions of streets, prior to the performance of said paving or repaving work. The maintenance of such streets shall include any repairs, as directed, including the filling of potholes, that may be necessary due to usage of the streets by traffic, and shall start from the date of written notice to commence work or actual start of work, whichever is earlier.

5. The Contractor shall notify the Police and Fire Departments in writing, with a copy to the Engineer, at least 24 hours in advance of a proposed closure of a street or roadway. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

6. The Contractor is required to submit to the Engineer, and appropriate agencies and departments responsible for the roadway involved, a plan and schedule of his method of operations on any detour. If the Contractor proposes any modifications, amendments or changes in location for detours

as called for, or proposes new detours, such changes and additions to the maintenance of traffic must be brought to the immediate attention of the Engineer and responsible agencies and departments involved.

7. The Contractor shall furnish, erect and maintain at closures, intersections and at all other locations, where required, all necessary standard or approved barricades, suitable and sufficient lights, torches, approved reflectors, danger signals, warning and closure signs, directional detour signs and whatever additional measures the Engineer may deem necessary for proper control of traffic and for the safety of all concerned, all in accordance with the rules and regulations of the NYSDOT. He or she shall indicate by day and by night the impassable and dangerous conditions existing on or adjacent to the site of the work. He or she shall provide a sufficient number of watchmen and take all necessary and legal precautions for the protection of the work and for the safety of the public, as required by the Contract. All barricades, danger signals, warning signs and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise.

8. Barricades shall be placed parallel to, adjacent to and on both sides of excavations for curbs and sidewalks. Each line shall have a clear space of not more than twenty-five (25) feet between barricades. Barricades shall be Type III Breakaway Barricades issued by the NYSDOT. Each barricade shall have at least one (1) solar powered flash-type warning device with battery backup affixed thereon, as approved by the Engineer.

9. The Contractor shall furnish material, labor and equipment at any time, day or night, to immediately repair, remedy and prevent washouts, formation of holes, ruts and depressions, sunken trenches and the destruction or sinking of temporary pavements, both when the work is under way, and when the work is temporarily suspended for any period of time. Special attention shall be given to maintenance of a satisfactory travel way over weekends, holidays and nights.

10. In the case of traffic being diverted from the accustomed traveled way, onto the road shoulder or onto an area not immediately affected by the actual construction work, occasioned by the location of the trench, excavation, materials or equipment, the shoulder or areas outside of the project so affected, shall be restored to a condition equal or better than the original condition. This shall apply equally as well to those pavements or any detours or a designated area, over which traffic was routed.

11. The Contractor shall keep the travel way free of foreign objects such as rocks, timber and other items that may fall from transporting vehicles. Spillage of material carried by or dropped from the under-carriage of any carrying vehicle resulting from the Contractor's hauling operations along or across any public travel way, shall be removed immediately and such travel way, both within and outside of the Contract limits, shall be kept free of such spillage by the Contractor. Existing pavement and shoulder surfaces

along or across any public travel way shall be cleaned at a minimum of once per week with a mechanical street sweeper. This shall include all truck routes to and from the project site. The Engineer shall approve all cleaning equipment prior to use. Cleaning shall continue until adequate cleaning results as determined by the Engineer.

12. Whenever dusty conditions resulting from the Contractor's operations occur, they shall be corrected by sweeping the area to remove excess materials and by spraying the area with water to control any dust in accordance with Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control.

13. Whenever it becomes necessary to maintain and limit traffic to one lane, the Contractor shall provide adequate traffic controls on the section of highway or roadway on which vehicle operation is maintained. He or she shall employ a sufficient number of competent flagmen and/or temporary traffic lights operating continuously during the time traffic is so maintained. In the event the length of the one-lane operation is extremely short and conditions are favorable to safe operation, the Engineer may, in writing, authorize the Contractor to dispense flagmen or traffic control signals.

14. The Contractor shall also provide a sufficient number of competent flagmen in areas where traffic is congested, particularly where construction equipment is operating.

15. The Contractor shall provide an adequate travel way as specified and devote particular attention to all drainage facilities, keeping them fully operative at all times.

16. The Contractor shall furnish and erect temporary fencing around all unattended excavations. Lighted barricades and warning signs shall also be used around the perimeter and at a significant distance away from the excavation in each traffic flow direction (whether vehicular or pedestrian) so as to warn vehicles or pedestrians of the existence of the excavation.

    a. Temporary wire fences shall be furnished and installed at the site by the Contractor and shall completely enclose all excavations, steep embankments and other potentially hazardous locations as soon as such a condition is apparent and as ordered by the Engineer. This fence is in addition to any provision that the Contractor would normally follow to safeguard such Work operations as specified in Section 01 56 00 – Temporary Barriers and Enclosures, and in no way reduces the Contractor’s obligations as required by the Contract Documents.

    b. Excavation for basins, inlets, manholes, seepage basins, pipe connections, sewers and other miscellaneous structures shall be protected by installing a five (5) foot high, 2" x 4" mesh, #14 gauge, welded-wire fabric fence around the periphery. Stay wires shall be 2" apart; line wires 4" apart. Wire fabric shall be securely attached

to approved posts which are driven into the ground. Maximum post spacing shall be eight (8) feet. The said excavation shall be further protected by the use of barricades.

c. The Contractor shall furnish, erect, relocate, maintain and remove all temporary fencing required under this Section.

d. The Contractor will be permitted to remove such portions of the fencing as may be required for his operations during working hours, providing that the public is continuously safeguarded by other satisfactory means during these operations. In all such cases the fence must be restored at the end of each workday.

e. The fence and warning devices shall be maintained in good repair throughout the duration of the work and shall be removed upon completion of the work.

17. Decking, in general, shall consist of heavy, adequately sized, steel plates completely covering excavations where pedestrians and vehicular traffic make this decking operation necessary.

18. The Contractor shall construct and maintain at all times, where called for or as directed, temporary bridges or bridging across pipe trenches, excavations, obstructions and newly-laid pavements, to provide adequate ingress and egress for pedestrian and vehicular traffic to and from private driveways, business and commercial establishments or for main street intersections and heavily traveled crossings. The Contractor will be required, after the installation of all pipes and necessary appurtenances thereto, to immediately backfill and compact all trenches to existing grade, to permit the resumption of traffic without delay.

19. Road plates shall be in accordance with the NYCDOT Standard Highway Specifications. Steel plates shall be provided over all excavations in front of driveways and excavations over which pedestrian or vehicular traffic is to be maintained. Plates shall be of a thickness sufficient for the loads to be carried and shall have not less than two (2) feet of bearing on either side of an excavation. Width of plates for vehicular traffic shall not be less than ten (10) feet, and for pedestrian traffic not less than four (4) feet. Road plates shall be secured and skid resistant. Plates for pedestrian traffic shall be equipped and approved, dismountable handrails on both sides, for the full lengths of plates. The Contractor shall be responsible for the adequacy of all plates.

a. Where roadway pavement excavations have not been backfilled to grade within seven (7) calendar days of excavation and the roadway is required to be opened to traffic by covering the excavation with steel plates, the Contractor must recess the steel plates into the pavement surface by either stripping or grinding the asphalt pavement around the perimeter of excavations, as required, to

embed the plates flush with the adjacent pavement surface at no additional cost to the City.

b. In order to accommodate the Five Borough Bike Tour, the New York City Marathon Race, or any other NYC special event, the Contractor shall be required to open the full width of streets along the event routes , as applicable, at least fifteen (15) days prior to the date of the scheduled event. As part of this requirement, The Contractor shall remove all stored materials within the project limits along the event route. Additionally, all road plates along the event route shall be recessed 2" and temporarily paved with Asphaltic Concrete Mixture [two (2") inches thick] and made flush with the adjacent pavement surface at no additional cost to the City.

20. During all phases of construction, provisions shall be made for access for all emergency vehicles, such as firefighting equipment, police vehicles, ambulances, etc.

21. The Contractor shall furnish and maintain, as required and as directed by the Engineer, reflectorized signs for the information of the motorist, and to adequately and legally post the highway under construction as to its status.

22. The City shall have the right to open to vehicular traffic those areas adjacent to the structures upon which Work has been completed before the final acceptance of all Work. The Contractor shall carry on the remaining Work so as not to interfere with or endanger such vehicular traffic and shall make no claim for damages on account thereof.

23. At the conclusion of the Work, all temporary facilities shall be removed and the area restored to pre-work conditions or better, unless otherwise specified. The Contractor shall, when ordered, remove existing street signs; store, protect and keep them clean. Where necessary to remove such signs, the Contractor shall prepare a location plan prior to removal. He shall replace signs so removed in their original location or as directed, as promptly as possible. Signs not to be replaced shall be cleaned and delivered to the Engineer as directed by him.

24. Signs or markers lost or damaged because the Contractor failed to properly install or maintain shall be replaced at the Contractor's expense.

25. The Contractor shall maintain route marker signs during construction. Should relocation be necessary at various stages of construction, they shall be placed in locations visible to traffic, as directed.

B. Temporary Signs

1. The Work shall consist of the fabrication, furnishing, installation, erection, assembly and maintenance of warning, detour, regulatory, guide and directional signs required to properly stage the Work and maintain traffic and shall include the furnishing and incorporation of sign supports and posts; the furnishing and installation of all fastening devices and

miscellaneous appurtenances; and the relocation, removal and disposal of signs or sign assemblies.

C. Type III Breakaway Barricades

1. All methods shall comply with NYSDOT Standard Details of Construction.

D. Timber Curb

1. Construction of timber curb shall comply with the New York State Department of Transportation. Spike holes in 12" x 12" timber and in the 2" x 8" splice plates shall be predrilled. Reflective material shall be wrapped around posts, lapped and tacked on a side opposite the traffic face or side of post. After assembly, the front and rear faces and the top of 12" x 12" timbers shall be painted with alternate white and orange stripes. Two (2) coats of each color shall be used. White stripes shall be thirteen (13) inches wide and orange stripes shall be eleven (11) inches wide.

2. Timber curb units shall be placed where shown or directed with traffic faces flush. Abutting ends of units shall be spliced. Unless otherwise directed by the Engineer, both ends of all units shall be spiked into the ground or surface material. Timber curb shall be maintained in first class condition at all times to the satisfaction of the Engineer. Maintenance shall include the replacement of damaged components; refastening; repainting; anchoring or re-anchoring; replacing and re-affixing reflective material; and re-splicing; all, when necessary or ordered and directed by the Engineer. At the completion of the work or when directed by the Engineer, timber curb shall be removed and disposed of away from the work site.

E. Timber Barricades

1. The Work shall consist of the construction, installation, erection, placement, maintenance, removal and disposal of lighted and unlighted timber barricades. It shall include the furnishing and incorporation, as required, of all timber, lumber, fastenings, anchors, reflectorizing materials, solar powered flashers with battery backup and other warning devices; paints and painting; and furnishing all labor, materials, plant, equipment, insurance and necessary incidentals required and completing the work. Construction of timber barricades shall comply with the NYSDOT Standard Details of Construction.

2. Lighted timber barricades shall be placed at the locations shown on the plans or designated by the Engineer. Unless otherwise shown on the plans or directed by the Engineer, barricades shall be constructed, installed, erected, placed, reflectorized and lighted in conformity with the applicable rules and regulations of the New York State Department of Transportation.

3. Barricades, at all times shall be maintained in a condition satisfactory to the Engineer. Maintenance shall consist of the replacement of all damaged or worn out components; repainting, as required or directed; replacement of

reflectorizing materials; and general rehabilitation to keep barricades in good condition during the life of the Contract.

4. Lighting of barricades shall be by solar-powered flashing units with battery backup.

5. At the completion of the Work or when directed by the Engineer, barricades shall be removed and disposed of away from the work site.

F. Plastic Barrels

1. Furnishing and installing plastic barrels will be for the purpose of traffic lane delineation during construction. The barrels shall be placed in a straight line 25 feet apart, within the work area. A flashing light shall be affixed to every fourth barrel. After placement, the barrels shall be filled with sand for one third of their height.

2. At the completion of the Work or when directed by the Engineer, the plastic barrels shall be removed and disposed of away from the work site.

G. Temporary Construction Fencing

1. All methods shall be in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

H. Temporary Pavement Marking Type

1. Application shall be as recommended by the manufacture or as directed by the Engineer.

I. Precast Concrete Median Barrier (Jersey Barrier)

1. All methods shall be in accordance with NYSDOT Standard Sheet 606-36 Precast Concrete Barrier.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 56 00 – TEMPORARY BARRIERS AND ENCLOSURES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Maintenance and Protection of Traffic (MPT) devices

B. Fencing

C. Protection of Work, personnel and materials

D. Tree and plant protection

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Erection	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 55 26 – Traffic Control

1.04 REFERENCES

A. NYS Department of Transportation (NYSDOT) Standard Specifications

B. NYS Department of Transportation (NYSDOT) Standard Sheets

C. OSHA Standards 29 CFR 1926

1.05 DESCRIPTION

A. MPT Devices

1. Roads, Parking Areas and Sidewalks

a. The Contractor shall provide, erect and maintain as necessary for the Work, all MPT devices as necessary and in accordance with Section 01 55 26 –Traffic Control. These devices shall include, but not be limited to temporary concrete barriers, timber curb, Type III barricades, barrels, construction signs, warning signs, wide angle reflectors, temporary striping and warning lights along all roads, parking areas and sidewalks that are accessible to the public or City personnel and in such other areas of the Site as needed for the safety of all persons at the Site.

b. Sufficient barricades shall be erected to keep vehicles from being driven on or into Work under construction in accordance with NYSDOT requirements.

2. Excavations

a. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property.

b. The Contractor shall, at its own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workers. Bridges provided for access during construction shall be removed when no longer required.

c. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the City and Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the City and Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.

d. The Contractor shall take precautions to prevent injury to the public or City personnel due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public or City personnel shall be well lit from sunset to sunrise.

3. The Contractor's responsibility for the maintenance of barricades, signs and lights shall continue throughout the duration of the Work. The Contractor shall provide and maintain other warning signs and barricades in other Work areas as may be required for the safety of all those employed in the Work, plant operating personnel, or those visiting the Site.

B. Fencing

1. Temporary Construction Gates and Fencing

a. As required or directed by the Engineer, the Contractor shall furnish and erect a new temporary 10-foot high chain link fence, gates and all necessary incidentals in accordance with NYSDOT Standard Specifications, Section 607 and NYSDOT Standard Sheets No 607-01 through 607-06, with the following exception:

1) Fabric for fencing shall be aluminum-coated steel wire with a mesh size of 1-inch, complying with the requirements of AASHTO Designation M 181.

2. Safety Fencing

a. The Contractor shall provide and erect, when required or directed by the Engineer, temporary project safety fencing at the Work Site.

b. The safety fencing shall be a high visibility, orange colored, high-density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10-foot centers.

3. Fencing shall be maintained by the Contractor for the duration of the Contract. Upon Final acceptance of the Work, fencing shall become the property of the Contractor and shall be removed from the Site, unless otherwise directed by the Engineer.

4. Maintenance shall include, but not be limited to, graffiti removal, repair of cracks and breaks in the fencing, and re-painting of the fencing as directed by the Engineer.

C. Protection of Work, Personnel and Materials

1. Until permanent walls, railings, stairs, hatches, etc., are in place, the Contractor shall be responsible for the installation and maintenance of temporary barricades and temporary railings around openings, stairwells, on temporary or permanent stairs, around the perimeter of elevated floors, landings, permanent ramps, etc. The installation shall be in accordance with the requirements of OSHA Standards 29 CFR 1926 and the codes and regulations of authorities having jurisdiction.

2. During the progress of the Work and up to the date of Substantial Completion, the Contractor shall be solely responsible for the care and protection of all Work, personnel, and materials covered by the Contract.

3. In order to prevent damage, injury or loss, actions taken by the Contractor shall include, but not be limited to, the following:

   a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not interfere with the progress of the Work or the work of any Other Contractor or utility service company.

   b. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft or breakage.

   c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.

   d. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by the Contractor's operations, to the end that at all times the Site shall present a safe, orderly and workmanlike appearance.

4. The Contractor shall protect the existing work and material from damage by its workers and shall be responsible for repairing any such damage at no additional cost to the City.

D. Tree and Plant Protection

1. Protect existing trees, shrubs, and plants on or adjacent to the Site, shown or designated to remain in place, against unnecessary cutting, breaking, damage, or skinning of trunk, branches, bark, and roots.

2. Do not store materials or equipment or park construction equipment and vehicles within foliage drip lines.

3. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.

4. Open fires are not allowed onsite.

5. Within the limits of the Work, water trees and plants that are to remain to maintain their health during construction operations.

6. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, runoff, and noxious materials in solution.

7. If branches or trunks are damaged, prune branches immediately and protect cut or damaged areas with emulsified asphalt compounded specifically for horticultural use, in a manner acceptable to the Engineer.

8. When directed by the Engineer, remove and dispose of at location away from the Site damaged trees and plants that die or suffer permanent injury, and replace each damaged tree or plant with specimen of equal or better species and quality.

9. Other applicable methods of tree protection shall be as required by Section 31 10 10 – Site Clearing.

E. The Contractor shall remove all temporary barriers and enclosures at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Temporary Construction Fencing

1. All materials shall comply with NYSDOT Standard Specifications, Section 607 - Fences.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 ERECTION

A. Temporary Construction Fencing

1. All methods shall comply with NYSDOT Standard Specifications, Section 607 - Fences.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 57 00 – TEMPORARY CONTROLS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. General Requirements
2. Prohibited construction procedures
3. Noise Control
4. Dust Control
5. Pest and Rodent Control
6. Pollution Control
7. Care during Welding
8. Notification of Non-Compliance
9. Storm Water Runoff Control
10. Site Security

B. The following index of this Section is presented for convenience:

Paragraph	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 55 – Site Security

C. Section 01 57 16 – Temporary Pest Control

D. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to ensure adequate environmental protection including implementation of all erosion and sediment control measures as directed by the Engineer and specified herein.

2. In the performance of the Contract, the Contractor shall comply with all applicable federal, State and local laws and regulations concerning environmental protection, restoration and erosion and sediment control.

3. The Contractor shall remove all temporary environmental protections at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit Shop Drawings as specified in Section 01 33 00 – Submittal Procedures.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Prohibited Construction Procedures

1. The following construction procedures are prohibited:

a. Dumping or wasting of spoil material into any stream corridor, any surface waters or at unspecified locations adjacent to the Work area or at locations not approved by the Engineer.

b. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridor or surface waters.

c. Dumping of silt-laden water directly into any stream corridor or surface waters without provision for treatment as noted herein.

d. Damaging vegetation adjacent to or outside of access roads or limited right-of-way for the Work. All construction operations must be confined within the Contractor's Work limits as shown and/or specified.

e. Disposal of trees, bush and other debris into any stream corridor, any wetlands or at unspecified locations.

f. Open burning of materials.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Cover and Liner Fabric for Stockpiles

1. Cover and liner fabric for stockpiles shall be as specified under Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Noise Control

1. All sound attenuation measures shall comply with the New York State Noise Related Statutes and Policies.
2. The Contractor's vehicles and equipment shall be operated and maintained so as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest regulatory standards and in no case will noise levels be permitted which interfere with the work of the on-site personnel.
3. All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
4. Air powered equipment shall be fitted with pneumatic exhaust silencers.
5. It has been determined through modeling that during normal daytime working hours and during normal nighttime working hours as per Section 01 14 00 – Work Restrictions, Paragraphs 1.05A.1 noise levels from construction site is not expected to exceed an Leq of 57 dBA during the daytime hours and 45 dBA during nighttime hours, when measured at any residences, churches or schools as long as the equipment being used concurrently is limited to the items in Table 3.03.A.6.b and the Contractor implements all sound attenuation measures as required in the New York State Noise related Statutes and Policies for exterior mechanical equipment and ambient noise quality, USEPA Noise Emission Standards for Construction Contracts, and other regulatory standards.
    a. These noise level standards shall apply seven days a week for the duration of the Contract.
    b. Compliance with the noise level requirements specified in Paragraph 3.03.A.1 and 3.0A.5 herein above shall be understood as a material requirement of this Contract.
    c. Where there is a conflict or discrepancy between or among these specified noise levels, regulations and standards, the stricter requirement(s) shall pertain. No separate payment will be made for said items, as costs for these shall be understood as included in the lump sum price bid Item No. G-LS-3.
    d. All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained exhaust muffler. Such equipment shall include but not be limited to delivery vehicles, cranes, dump trucks, excavation equipment, generators, and trucks removing soil, rock, or material of any kind from the site.
    e. Where operations by the Contractor are determined by the City to fail to comply with the specified noise levels, regulations or standards, the Contractor shall discontinue said operations immediately. Operations will be permitted to resume only after the Contractor has submitted for the approval of the Engineer a revised procedure for the performance of said operations in a manner that will ensure compliance. All repairs shall be made at no increase to

the Contract price. In addition, the Contractor will have no claim for additional compensation or Contract time if the Resident Engineer ceases operations due to non-compliance with the specified noise levels.

f. The Contractor shall include in its Health and Safety Plan (HASP), to be prepared as specified in Section 01 35 27 – Environmental Health and Safety Requirements, the control measures that will be employed to ensure compliance with all specified noise requirements.

g. Bed of the trucks shall be lined with a noise attenuation mat. Delivery vehicles are not required to have noise attenuation mats.

h. Barriers will be located as close to the noise source as possible. Stockpiles of raw materials or spoils can be an effective sound barrier if strategically placed.

i. Quieter back-up alarms shall be required for all pre-2008 model year vehicles. These alarms should be automatic adjustable alarms that self-adjust to at least 10 decibels or louder as compared to background noise. 2008 model year or newer vehicles shall be equipped with these warning devices in accordance with OSHA standards.

j. All housing doors of combustion engines shall be kept closed by using noise-insulating material mounted on the engine housing.

k. Use of portable barriers with acoustical insulation or noise-insulating fabric around all smaller, portable noise generating equipment such as compressors, generators, pumps and other such devices shall be required.

l. Cranes shall be equipped with hospital grade silencers capable of producing a noise reduction of 35 dBA, jack hammers would be jacketed and have mufflers, diesel and propane generators and diesel light fixtures would have external noise enclosures to attenuate noise levels by at least 5 dBA, and impulsive noise generated by dropping spoils in truck bins with padded/rubber liners.

m. The beds of dump trucks and trucks removing soil, rock, or material of any kind from the Work site or delivering raw materials to the Work site shall be covered with tarpaulins when loaded. The cover shall be secured to the truck so that no contents of the bed may be seen when the bed is viewed from above.

6. Noise control during reconstruction of Gilboa Dam under Contracts CAT-212B and CAT-212C has been evaluated through the application of the CadnaA noise model.

a. For Contract CAT-212E, compliance with the noise requirements of the Contract shall be satisfied provided that the Contractor does not

exceed the listed items of equipment in concurrent operation noted in paragraph 3.03.A.6.b during normal operation.

b. Concurrent Construction Equipment for Reasonable Worst-Case:

Equipment Type	Assumed Maximum 7:00 AM to 5:00 PM
Bulldozers	4
Flat-Bed Trucks	1
Loaders	6
Air Compressors	8
Heavy-Duty Roller/Compactors	1
Forklifts/Manlifts	9
Pick-up Trucks	6
Fuel Trucks	3
Generators (Diesel)	5
Generators (Propane)	4
Jack Hammers	3
Diesel Light Fixtures	0
Hydraulic Surface Drills	1
Water Excavating Pumps	1
Delivery Trucks	3 per hour, 20 per day
Dump Truck Trips (30-cy)	100 per hour, 160 per day

7. The list of operating equipment items provided in Paragraph 3.03.A.6 is intended to represent the reasonable worst-case scenario for the maximum number of concurrent operating equipment types to be utilized during CAT-212E. The Contractor may seek to increase the total number of operating units in a given category shown in Paragraph 3.03.A.6 or seek approval of a different mix of operating units than reflected in the table. In each case, the Contractor shall submit a detailed listing of the total equipment expected to be in concurrent use. Such information shall be in sufficient detail to facilitate additional modeling runs to be performed by the Engineer for the purpose of establishing compliance with the applicable noise limits.

8. The Contractor shall review its operational plan and Work schedule on an annual basis and submit any requests for deviations for the approved equipment lists in Paragraph 3.03.A.6 no later than March 1 of each year of active construction. The initial request for deviations at the commencement of the construction under CAT-212E shall be submitted within 60 days of the Order to Commence Work.

9. The standard for acceptance of alternative equipment list submitted by the Contractor pursuant to Paragraphs 7 and 8 immediately above shall be to demonstrate compliance with Paragraph 3.03.A.2.5 and the City's incremental PM2.5 requirements through noise and air dispersion modeling, respectively.

B. Dust Control

1. The Contractor shall be responsible for controlling objectionable dust caused by his operation of vehicles and equipment, clearing or for any reason whatsoever. Contractor shall conduct all operations and maintain the area of activity to minimize creation and dispersion of dust.
2. The Contractor shall apply water to keep dust in the air to a minimum. The use of calcium chloride for dust control shall not be permitted.
3. Dust control for construction activities at all work areas shall be as follows:
4. Non-paved roadways and parking areas, which are used for construction traffic, shall be sprayed at least every other hour with water during the hours of construction unless otherwise approved by the City.
5. Contractor shall regrade unpaved roadways and parking areas once a week to the satisfaction of the Resident Engineer.
6. All other construction areas shall be hosed down twice a day with water during the hours of construction, or as deemed necessary by the Engineer
7. The Contractor shall erect runoff barriers or other means to ensure that runoff generated from dust control activities does not enter the Schoharie Creek or Schoharie Reservoir.
8. The Contractor shall comply with the requirements of Section 31 25 10 – Dust, Soil Erosion and Sediment Control.
9. As required, Contractor shall control dust 24 hours a day, 7 days a week when no construction activity is ongoing.

C. Pest and Rodent Control

1. Provide rodent and pest control as necessary to prevent infestation of construction or storage area.
2. Employ methods and use materials which will not adversely affect conditions at the Site or on adjoining properties.
3. All chemicals shall be approved by the Engineer prior to their use and shall be safe for use in drinking water environment.
4. The Contractor shall comply with the requirements of Section 01 57 16 – Temporary Pest Control.

D. Pollution Control

1. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
2. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
3. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of the EPA and other recognized

certifying agencies. Use of all such chemicals and disposal of residues shall be in strict conformance with regulatory requirements.

4. The Contractor's equipment used during construction shall conform to all current Federal, State, and local laws and regulations.

E. Care during Welding

1. Provide protection of City's workers from welding arcs during the construction by providing adequate welding shields.

F. Notification of Non-Compliance

1. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of this Section and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or its authorized representative at the Site of the Work, shall be deemed sufficient for the purpose.

2. If the Contractor fails or refuses to comply promptly, an order stopping all or part of the Work may be issued by the City until satisfactory corrective action has been taken.

3. No part of the time lost due to any such stop work orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor, unless it is later determined that the Contractor was in compliance with the provisions of this Section.

4. The Contractor shall be responsible for its Subcontractors' compliance with the provisions of this Section.

G. Stormwater Runoff Control

1. Prevent discharge of sediment to and erosion from the Site to surface waters, drainage routes, public streets and rights-of-way, and private property, including dewatering operations.

2. Prevent trash, demolition waste and construction debris from contaminating storm water runoff.

3. Provide berms, dikes, and other acceptable methods of directing storm water around work areas to drainage routes.

4. Storm water runoff controls shall be inspected daily. Problems and deficiencies shall be brought to the attention of the Engineer and corrected promptly.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Site Security

1. The Contractor shall comply with the requirements of Section 01 35 55 – Site Security.

B. Stockpiling of Materials

1. Stockpiling of excavated materials shall be handled in accordance with Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 57 16 – TEMPORARY PEST CONTROL
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pest Control Service
2. Regulatory Requirements
3. Material Requirements
4. Packaging
5. Safe Operation

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental, Health and Safety Requirements

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Pest Control Service:

1. The Contractor shall provide the services of a certified, licensed and insured pest control service for the purpose of exterminating and controlling pests at the Project Site whenever construction work is ongoing at the Site until the date demobilization is complete at the Site.

2. The Contractor shall provide rodent control as follows.

a. The rodent (i.e., rat) traps shall be effective and adequate in number placed within the site perimeter and at locations directed by the Resident Engineer. Each trap shall be checked monthly to ensure that they are properly baited and in proper working condition. All traps shall be rebaited monthly as required.

3. The Contractor shall provide mosquito control during the summer months as follows.

a. The Contractor shall provide an extermination schedule prior to commencing spraying based on the recommendation of the pest control service and/or the chemical manufacturer.

b. The Contractor shall identify and eliminate standing water as soon as possible. Where the standing water is not a part of the Contract Work or is not under the control of the Contractor, the standing water shall be reported to the Resident Engineer. To the extent possible pools of standing water shall be removed rather than applying insecticide to any pools of standing water to control the breeding of mosquitoes.

4. The Contractor shall furnish all labor, equipment, and materials necessary to implement a Rodent and Insect Control Program.

a. On and around the Resident Engineer's field office, parking lot, guard booth, and portosans.

5. All Work shall be performed by an exterminator licensed in the State of New York and shall comply with all requirements of the New York State Department of Health for rodent and insect control. The exterminator shall only use products approved by the U.S. Environmental Protection Agency (EPA) for rodent and insect control.

6. The Contractor shall perform one full round of rodent and insect control on and around the areas specified in this Section once every two months

from October through May and once every month from June through September.

B. Regulatory Requirements

1. The Contractor and the pest control service shall comply with all Federal, State, and local ordinances, codes and regulations regarding the following:

a. Performing the pest control service.

b. Utilizing only the pesticides recommended by the manufacturer for the purpose intended and which will not create a hazard to health or property.

c. Cleaning up and disposing of all pesticides and pests.

2. The Contractor shall comply with all requirements of New York City Local Law 37 (LL 37) of 2005, including, but not limited to:

a. The prohibition of certain pesticide products for use on New York City property;

b. The requirement for notices at least 24 hours prior to pesticide applications; and

c. Reporting and recordkeeping requirements.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. The Contractor shall provide a Rodent and Insect Control Plan

B. The Contractor shall provide, as required by LL 37, detailed information regarding each pesticide application.

1. The Contractor shall ensure that all records are provided to New York City using the NYC Department of Health and Mental Hygiene (DOHMH) Pesticide Use Reporting System (NYCPURS).

a. The Contractor shall confirm that the information regarding any prior month applications has been properly submitted through NYCPURS. A copy of such information shall be included in the monthly Contractor Environmental, Health and Safety (EHS) report in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

2. The LL 37 required information, including any necessary prior notifications, shall be provided to DEP on the reporting forms established by the NYC DOHMH or approved equivalent.

a. This information shall be provided to DEP as part of the monthly Contractor EHS report in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

b. By February 1 of each year, the Contractor shall provide a complete summary of all LL 37 required information for all pesticide applications at the project site for the entire prior year.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Pesticides shall be stored, handled, and used in accordance with the manufacturer's label and directions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Pesticides shall be approved commercially available products that are currently registered by the United States Environmental Protection Agency and the New York State Department of Environmental Conservation. Pesticides shall also have all required labels indicated that they are approved for the intended use.

1. Pesticides prohibited by LL 37 may not be utilized.

B. Pesticides shall be mixed and used in strict conformance with the instructions on the label or supplemental labels.

C. Packaging:

1. Pesticides shall be delivered and securely stored, until used, in the manufacturer's standard containers that have legible labels affixed in accordance with the provisions of the Federal, State, City and local pesticides laws, rules and regulations in effect at the time of delivery.

2. Pesticides that do not meet these packaging requirements, at any time, will be rejected by the Resident Engineer and shall be removed from the site immediately.

3. The Resident Engineer shall reject any pesticides that have become wet, caked or otherwise unfit for use.

4. The basis of acceptance shall be original, sealed, and properly labeled pesticide containers.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Before performing any pest control work, the technician shall report to the Resident Engineer 24 hours prior to announce his presence and to ascertain if there are any special areas which need to be addressed.

3.02 IMPLEMENTATION

A. Safe Operation

1. The pest control service shall exercise caution in the application of pesticides and other operations in order not to endanger or injure on-site personnel or the public. Rates and methods of application shall be in accordance with the manufacturer's instructions on the pesticide label.
2. All pesticides shall be delivered in original containers or packaging or in service containers properly labeled as required by law. All pesticides shall be secured at all times against unauthorized access.
3. Residual pesticides and containers shall be disposed off-site in accordance with the label instructions and applicable Federal, State, City and local regulations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 58 13 – TEMPORARY PROJECT SIGNAGE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Attachments: The following figures are attached to this Section:

1. Figure 1 – Project Information Panel Layout (For Projects with Street Frontage of 60 Feet or Greater)

2. Figure 2 – Project Information Panel Layout (For Projects with Street Frontage of Less than 60 Feet)

3. Figure 3 – Environmental Facilities Corporation (EFC) Construction Sign Schematic: Drinking Water State Revolving Fund (DWSRF)

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used.

1.05 DESCRIPTION

A. The Contractor shall procure and erect a project information panel at the Project Site identifying the Project. The panel shall be erected within twenty-one (21) days from the date the Contractor is ordered to Commence Work and shall be in accordance with this Section.

B. Approval from the local municipality having jurisdiction shall be obtained before installation of the Project information panel.

C. Names of individuals on the Project information panel(s) shall be updated by the Contractor when these names change, at the direction of the Engineer.

D. The Contractor shall remove all temporary project signage at the completion of the Work and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit the following for approval prior to fabrication of the project information panel:

1. Detailed sketch showing all lettering, dimensions and colors.

2. Detailed bill of materials indicating materials of construction for all project sign components.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The project information panel shall be manufactured by one of the following:

1. Mineola Signs, Mineola, New York; http://mineolasigns.com/

2. Or approved equal

2.02 MATERIALS / EQUIPMENT

A. Project Information Panel

1. The Project information panel shall include the following requirements shown on Figure 1 or Figure 2 attached to this Section. The Engineer will provide project specific information.

a. For construction sites with a street frontage of 60 feet or greater, the sign dimensions shall be in accordance with Figure 1. For construction sites with a street frontage less than 60 feet, the sign dimensions shall be in accordance with Figure 2.

b. For projects that are not funded through the New York State Revolving Fund, the information and lettering shown below the sample rendering in Figures 1 and 2 should be removed and the rendering extended to fill that space.

2. Project information panels shall include the following information:

a. A rendering, elevation drawing, site plan, or zoning diagram of the building exterior that does not contain logos or commercially recognizable symbols;

b. A title line stating "Work in Progress:" and specifying the nature of the project;

c. Anticipated Project completion date as season YYYY;

d. Website address to contact for Project information;

e. The corporate name and telephone number of the Contractor;

f. The name(s) of government official(s) shall be incorporated into the panel in accordance with Figures 1 and 2.

3. The Project information panel shall be constructed of ¾-inch thick plywood panel of the following quality or equal as approved by the Engineer:

a. High density overlaid exterior type fir plywood panels, 5 ply, B-B grade or better.

b. Each plywood panel shall be resin impregnated on both sides.

4. The content shall be written in the Calibri font or similar Sans Serif font style, with letters a minimum of 1 inch (25 mm) high, as measured by the upper case character. Such letters shall be white, on a blue background, with such blue color of a shade matching Pantone 296, or RGB 15, 43, 84, or CMYK 100, 88, 38, 35.

B. EFC Clean Water State Revolving Fund (CWSRF)/Drinking Water State Revolving Fund (DWSRF) Sign

1. The EFC construction sign shall be constructed of ¾" minimum thickness plywood identical to that specified in 2.02.A.3.
   a. For a sample sign layout, refer to Figure 3: EFC Construction Sign Schematic: DWSRF.
2. Project information panels shall include the following fasteners, sign supports, coating, lettering, and emblem:
   a. Fasteners: All fasteners used in the fabrication of the sign shall be rust-proof
   b. Sign Supports: The sign shall be adequately supported and braced to remain in the proper positioning and alignment, including resistance to wind loads and toppling of the sign.
   c. Coating: All paint or exterior coverings used shall be exterior grade coating suitable for use on wood or the material of construction. The sign face background and sign back shall be white and consist of a minimum two coats of paint.
   d. Lettering and Emblem: The sign shall include the following logos in an aspect ratio consistent with other lettering on the sign but not less than a height of 2".
      1) The EFC logo available at https://efc.ny.gov/efc-logo-pdf
      2) For DWSRF projects only: The New York State Department of Health (DOH) logo available at https://nysefc.app.box.com/v/EFC-DOH-black
      3) The EPA logo consistent with the EPA Logo & Seal Specifications for Signage Produced by EPA Assistance Agreement Recipients as outlined in https://www.epa.gov/sites/default/files/2015-01/documents/epa_logo_seal_specifications_for_infrastructure_grants.pdf
   e. For CWSRF and DWSRF projects, incorporate the following language: This project is jointly funded by the New York State [Clean Water/Drinking Water] State Revolving Fund and the U.S. Environmental Protection Agency. The [CWSRF/DWSRF] is administered by the New York State Environmental Facilities Corporation [with its partner the New York State Department of Health (*for DWSRF projects only*)]. Other language as shown on Figure 3.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Location: The Project information panel shall be located in a prominent position as determined by the Engineer.

B. Panel Supports: Adequate supports for the Project information panel, including the positioning and alignment of the sign, as determined by the Engineer, shall be provided by the Contractor.

C. Maintenance: The Project information panel shall be maintained by the Contractor in good condition at all times for the duration of the Contract. The panel shall be replaced in its entirety for updates to information, names, or at the direction of the Engineer.

D. Removal of Project information panel from Project Site: The Contractor shall remove the Project information panel and supports from the Site when ordered by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

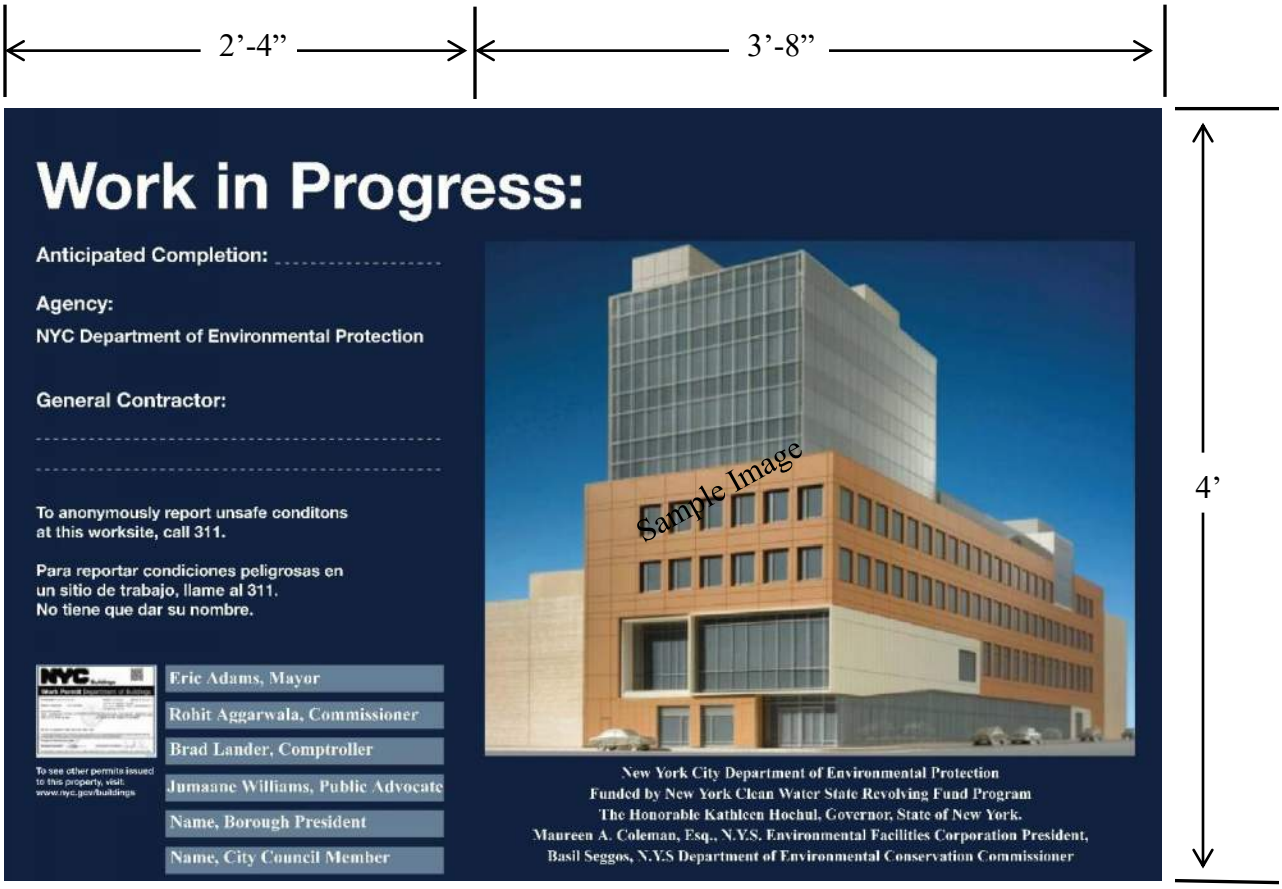
A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

FIGURE 1
PROJECT INFORMATION PANEL LAYOUT
(For Project Sites with Street Frontage of 60 Feet or Greater)



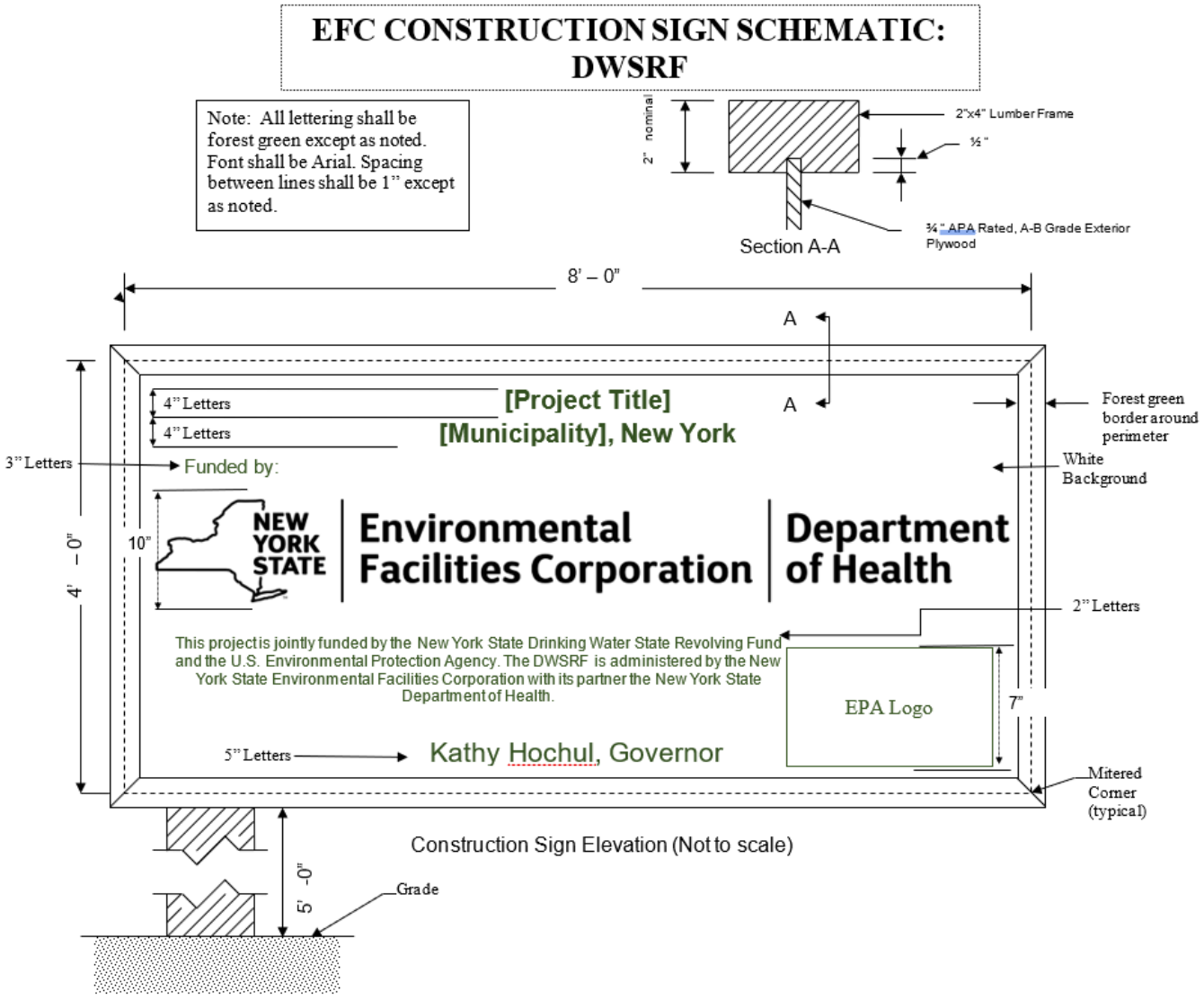
Note: As directed by the Engineer, the wording below the rendering shall be deleted if the project is not funded under the NYS Revolving Loan Fund and the rendering shall be extended to fill in that space.

FIGURE 2
PROJECT INFORMATION PANEL LAYOUT
(For Project Sites with Street Frontage of Less Than 60 Feet)



Note: As directed by the Engineer, the wording below the rendering shall be deleted if the project is not funded under the NYS Revolving Loan Fund and the rendering shall be extended to fill in that space.

FIGURE 3


EFC CONSTRUCTION SIGN SCHEMATIC:
DWSRF
Note: All lettering shall be forest green except as noted. Font shall be Arial. Spacing between lines shall be 1" except as noted.
2" nominal
2"x4" Lumber Frame
½ "
¾" APA Rated, A-B Grade Exterior Plywood
Section A-A
8' – 0"
A
A
4" Letters
4" Letters
[Project Title]
[Municipality], New York
3" Letters
Funded by:
Forest green border around perimeter
White Background
10"
NEW YORK STATE
Environmental Facilities Corporation
Department of Health
4' – 0"
2" Letters
This project is jointly funded by the New York State Drinking Water State Revolving Fund and the U.S. Environmental Protection Agency. The DWSRF is administered by the New York State Environmental Facilities Corporation with its partner the New York State Department of Health.
EPA Logo
7"
5" Letters
Kathy Hochul, Governor
Mitered Corner (typical)
Construction Sign Elevation (Not to scale)
5' -0"
Grade

SECTION 01 61 50 – GENERAL PRODUCT REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Equipment and appurtenances

B. Delayed approvals

C. Accessories included

D. Contractor's working equipment

E. Excessive loadings

F. Welding

G. Sole plates

H. Grouting

I. Operating instructions

J. Damage during tests and instruction periods

K. Work may be rejected at any time

L. Requirements for electrical work and electrical equipment

M. Service of manufacturer's engineer

N. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	7
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Implementation	7
3.03	Field Testing / Quality Control	7

3.04 Startup / Demonstration 7
3.05 Adjusting / Protection / Cleanup.....7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Equipment and appurtenances. Equipment and appurtenances shall be designed in conformity with ASME, ASTM, and IEEE standards, as applicable, and shall be of rugged construction and of sufficient strength to withstand all stresses that may occur during fabrication, testing, transportation, installation and all conditions of operation. Adequate stays, braces and anchors shall be provided. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers and the like shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

1. Machinery parts shall conform exactly to the dimensions shown on the Shop Drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high-grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable.

2. All equipment components shall comply with American standards, except where written permission is granted by the Engineer to deviate from such standards. Such standards shall include in part or in whole, but shall not be limited by, the standards, codes, specifications, or tentative specifications adapted and published by technical societies, organizations and bodies specified in the Contract. Thread components made to metric, Whitworth or other foreign standards are unacceptable.

3. All grease lubricating fittings on equipment shall be button head type and samples thereof shall be submitted for approval.

4. All machinery and equipment shall be safeguarded in conformity with the safety codes of the ANSI, OSHA and related New York State and New York City Codes.

5. All petroleum bulk storage tank installations shall be installed in accordance with the requirements of the Environmental Protection Agency, New York State Department of Environmental Conservation, the New York City Fire Department and Departments of Buildings and of Small Business Services and all other Agencies Having Jurisdiction (AHJ). The Contractor, at its own expense, shall obtain a facility registration certificate and all permits required. In addition, the Contractor shall submit a certified statement that the installation is in compliance with all regulations.

6. All electric motors shall be designed to conform to IEEE standards and to Section 26 05 91 – Low Voltage Electric Motors and Section 26 05 92 – Medium Voltage Electric Motors. Characteristics of electrical energy and source of supply are given in these Sections. Electric energy supplies at the site of the work is subject to commercial loads and operating variations. The voltage given in the Contract Documents is subject to correction for plant bus conditions and feeder drop. Adequate and proper provisions must be made so that all apparatus furnished hereunder will operate normally under such conditions.

7. Galvanized cast iron junction boxes or equivalent provisions for threaded conduit connections shall be furnished, unless otherwise specified or approved.

8. Equipment comprising several electrically operated devices shall be furnished completely wired and shall have all electrical appliances, conduit and connections that are integral parts thereof. Such connections shall terminate in a junction box of ample size.

9. Limit switches and other mechanically actuated switches shall be enclosed in cast metal boxes and be installed in the proper locations ready for rigid conduit connections. Switches shall be complete with all supports, stops, cams, arms, tripping and operating members which shall be adjustable where required for proper functioning. A complete statement of the scheme of control sequence and timing of operations required shall be submitted for approval. The electrical parts of mechanically actuated switches shall be encased as specified and be fully protected from shock and strain under all operating conditions. The manufacturer shall guarantee, for the service required, the electrical units and parts used in the assembly.

10. Electrical equipment shall be supplied only by manufacturers who maintain service facilities and spare parts stocks so that service and spare parts are capable of being furnished to a DEP specified location within a maximum time period of 48 hours. Service and stock shall be adequate for the equipment supplied, and evidence of such capability shall be presented when the equipment is submitted for approval.

11. Equipment manufactured outside continental U.S.A. shall be supplied only by manufacturers who maintain acceptable service facilities and spare parts stocks within the continental U.S.A. Service and stock shall be adequate for the equipment supplied and evidence of such facilities shall be presented when the name of the manufacturer is submitted for approval.

B. Delayed approvals. The time spent in approving working drawings, samples, equipment or other data which does not conform in every respect with the Contract Documents will not be considered as the basis for a claim for an extension of the Contract time.

C. Accessories included. The Contractor shall furnish, install and protect all necessary guides, track rails, bearing plates, anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be made of ample size and strength for the purpose intended.

1. Suitable templates and working drawings for installation shall be furnished.

2. The Contractor shall furnish with each piece of equipment one complete set of suitably marked special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. It shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with commercial grade cylinder locks and duplicate keys.

3. All spare parts shall be furnished as specified in the Contract. The Contractor shall furnish and install all specific equipment complete with all appurtenances, enclosures, means for connecting to power supply, and supporting structures necessary for standard operation of the equipment.

D. Contractor's working equipment. The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

E. Excessive loadings. Floor slabs shall not be subjected to excessive concentrated loads and in no case shall maximum safe loads be exceeded.

F. Welding. All structural welding and gas cutting shall conform to the requirements of the American Welding Society (AWS), American Society of Mechanical Engineers (ASME), NYC Department of Buildings (DOB) and the New York City Construction Code. All welding of pipe, fittings and pipeline equipment shall be performed by qualified welders as specified by the latest requirements of the ASME and AWS codes and their supplements, as applicable.

1. Welders shall be certified in compliance with Section IX Welding Qualifications of the ASME Boiler and Pressure Vessel Code or AWS D1.1 through D1.6, as applicable and as approved by the Engineer, and

shall be qualified by an independent testing laboratory approved by the City.

G. Sole plates. All equipment mounted to concrete without cast iron or fabricated steel equipment bases shall be provided with a sole plate approved by the Engineer.

H. Grouting. The Contractor shall, at its own expense, furnish all materials and labor for, and shall properly bed in epoxy grout each piece of equipment or its supporting base resting on masonry foundations.

1. The epoxy grout shall be pre-measured, fast curing, high strength, non-shrink, have good adhesion to concrete and steel, and resist degradation by oil, solvents and acids. All epoxy grouting material and installation procedures shall be approved by the manufacturer of the equipment being grouted and the Engineer.

2. The storage, surface preparation, forming, mixing, and placing of the grout shall be as recommended by the grout manufacturer.

3. Flowability of the material shall provide self-leveling for ease of placement.

4. Epoxy grout shall completely fill the space between the equipment or base and the foundation and it shall generally average one inch in thickness. Leveling wedges shall not be removed and jacking bolts shall not be backed off before final set of grout. Voids left by wedges shall be pointed. Exposed surfaces of epoxy grout shall be finished to the satisfaction of the Engineer. Final alignment of the equipment shall be checked in the presence of the Engineer.

I. Operating instructions. The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation, maintenance and care of all equipment installed hereunder.

J. Damage during tests and instruction periods. The Contractor shall be fully responsible for the proper operation of equipment during test and instruction periods and it shall neither have nor make any claim for damage which may occur to equipment prior to the time when the City formally takes over the operation thereof.

K. Work may be rejected at any time. If at any time an inspection, test or analysis of work reveals faulty design, inferior or defective materials, poor workmanship, improper installation, excessive wear or non-conformity with the requirements of the Contract Documents, such work will be rejected and shall be replaced with satisfactory work at the Contractor's expense.

1. Electrical appliances which have been subjected to damage by water shall be thoroughly dried out and put through a special dielectric test as directed by the Engineer, or shall be replaced by the Contractor, all at its own expense.

L. Requirements for electrical work and electrical equipment. Electrical work and electrical equipment shall be installed under the supervision of the Engineer and shall be subject to approval, inspection and test by the Engineer and by the NYC Department of Buildings (DOB) or the local AHJ.

1. The Contractor shall file with the Department of Buildings or the local AHJ an application for a certificate of electrical inspection and shall pay all filing and inspection fees, as required by the New York City Electrical Code (NYCEC) or local AHJ.

2. For service equipment rated 1000 KVA and larger, drawings shall be submitted by the Contractor for approval to the DOB, as required by the NYCEC; or as otherwise required by the local AHJ. The Contractor shall pay the filing fees required for each submittal.

3. The Contractor shall submit for the approval of the Engineer and as required by the DOB or the AHJ, complete Shop Drawings covering electrical equipment furnished under this Contract.

   a. Where submissions are required to be made by a Professional Engineer the Contractor shall secure these services at no additional cost to the City.

   b. Drawings shall include dimensioned outlines showing provision for and locations of conduit connections, detailed wiring diagrams, schematic wiring diagrams, installation layouts, material schedules, test data and supplementary descriptive data.

   c. Drawings shall be submitted to the Engineer for review before they are submitted to either the DOB or the AHJ.

   d. Upon receipt of approval or comments from DOB or the AHJ, the Contractor will return drawings to the Engineer with the disposition noted.

4. After full completion of its Work, the Contractor shall notify the local borough office of the DOB or the local AHJ, requesting a final inspection to be made.

M. Service of manufacturer's engineer. The prices bid for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent, from the company manufacturing the equipment, who shall assist the Contractor, when required, to install, adjust and test the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 65 00 – PRODUCT DELIVERY REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Delivery of products
2. Handling of products
3. Inspection of items
4. Supporting heavy loads

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 66 00 – Protection of Materials & Equipment

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall make all arrangements for transportation, delivery and handling of materials and equipment required for installation and completion of the Work.

2. Storage space at the Site is limited; the Contract Documents indicate the staging and available storage areas. Coordinate with the Engineer as to whether on-site storage will be permitted. Any off-site storage locations or facilities are to be inspected and approved by the Engineer prior to storing items.

a. When storage of materials and equipment is off-site, deliveries to the Site shall be schedule to coincide with installation of the items. Protection, handling and storage of materials shall be performed as per Section 01 66 00 – Protection of Materials & Equipment.

b. If necessary to move stored materials and equipment during construction, the Contractor shall move materials and equipment at no additional cost to the City.

3. Unless otherwise specified, the City's docking facilities or hoisting equipment at or near the Project Site will not be available for the Contractor's use.

4. Transport and handle products in accordance with manufacturers' instructions and in compliance with all federal, State and local laws.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Plan of Procedure as described in Article 1.08.D.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Products

1. The Contractor shall arrange deliveries of products in accordance with construction schedules and with ample time to facilitate inspection prior to installation.

2. The Contractor shall coordinate deliveries to avoid conflict with the Work and conditions at the Site and to accommodate the following:

a. Limitations of storage space

b. Availability of equipment and personnel for handling products

3. Materials and equipment shall not be delivered to the Site until related Shop Drawings, including the manufacturer's recommended storage instructions, have been approved by the Engineer.

4. Materials and equipment shall not be delivered to the Site until required storage facilities have been provided. Storage facilities and protection for products shall be as specified in Section 01 66 00 – Protection of Materials & Equipment.

5. Products shall be delivered to the Site in the manufacturer's original, unopened, labeled containers. The Engineer shall be informed of all deliveries of all materials and equipment.

6. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

7. Immediately on delivery, the Contractor shall inspect shipments to ensure:

a. Product complies with requirements of Contract Documents and approved Submittals.

b. Quantities are correct.

c. Containers and packages are intact and labels are legible.

d. Products are properly protected and undamaged.

B. Handling of Products

1. The Contractor shall provide equipment and personnel necessary to handle products in a manner that prevents soiling or damage to products or packaging.

2. The Contractor shall provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

3. The Contractor shall handle products in a manner that prevents bending or overstressing.

4. Heavy components shall be lifted only at designated lifting points.

5. Materials and equipment shall be handled at all times in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

C. Inspection of Items

1. The Contractor shall inspect all items including all boxes, crates and packages containing materials and equipment for damage that may have occurred during shipment prior to their removal from the truck or other

manner of conveyance. Any damage shall be reported immediately to the Engineer.

2. The Contractor shall then carefully remove the materials and equipment from the truck or trucks on which they were shipped. The materials and equipment shall then be transported to the place of installation at the Site. The Contractor shall be liable for loss or damage to the materials and equipment that may occur while being unloaded, transported, stored or installed.

3. All materials and equipment that arrives at the Site during Normal Project Working Hours, as described in Section 01 14 00 – Work Restrictions, shall be unloaded as soon as practicable.

D. Supporting Heavy Loads

1. Plan of Procedure: In all cases where heavy loads or demolition may temporarily affect existing slabs, the Contractor shall confirm the slab's load sustaining ability. Whenever heavy loads are to be stored or temporarily imposed on slabs, or whenever the structures may be impacted by demolition, the Contractor shall submit for approval by the Engineer a Plan of Procedure prepared by a licensed professional engineer, indicating a structural analysis of the slabs and methods of distributing loads, and providing auxiliary support so that slabs and beams are not loaded in excess of their design loadings.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 66 00 – PROTECTION OF MATERIALS & EQUIPMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Handling and storage of products

2. Protection of materials and equipment

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 65 00 – Product Delivery Requirements

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Storage of Products

1. Transport, store and handle products in accordance with manufacturer's methods and instructions and as required in Section 01 65 00 - Product Delivery Requirements.

2. Handle and lift products only at designated lift points and by methods to avoid soiling, disfigurement, bending, overstressing and damage.

3. Store products on shelves, in bins, or in neat groups of like items, with seals and labels intact and legible, and in a manner to provide access for maintenance and inspection.

4. Store loose granular materials on clean, solid, flat surfaces and prevent mixing with foreign matter. Store fabricated products supported above the ground on skids or blocking. Provide erosion control and surface drainage to prevent erosion and ponding of water as per the contract documents or directed by the Engineer.

5. Cover products subject to discoloration or deterioration with impervious sheet covering and protect products from soiling and staining.

6. Store and protect products that are subject to damage by the elements in weather-tight or climate-controlled enclosures, and according to manufacturer's instructions. Maintain temperature, ventilation, and humidity within ranges stated in manufacturer's instructions.

7. Attach applicable manufacturer's storage service instructions labeled "STORAGE SERVICE INSTRUCTIONS ENCLOSED" to exterior of each stored product.

8. Inspect, maintain and service stored products on a regularly scheduled basis, consistent with manufacturer's instructions.

9. Record inspection, maintenance and services performed and keep log available for review by the City and Engineer.

B. Protection of Materials and Equipment

1. The Contractor shall make every effort to minimize extended storage periods of materials and equipment at the Site by judiciously scheduling deliveries to coincide with construction needs.

2. Unless otherwise specified, storage of any mechanical or electrical equipment or other ultraviolet or weather sensitive items out of doors at any time is prohibited regardless of the protection furnished. Storage of mechanical and electrical equipment within structures at the Site will not be permitted unless the structures are enclosed. A structure shall be considered to be enclosed when it is roofed and has protection of doorways, windows and other opening closures.

3. All mechanical and electrical equipment shall be coated, wrapped and otherwise protected from snow, rain, drippings of any sort, dust, mud, condensed water vapor, etc., during shipment, storage, and installation and until placed in service.

4. All storage areas for motors shall be heated. Space heaters shall be supplied, as required, in all enclosures being utilized for storage of motors. Motors equipped with space heaters shall be properly wired and the heaters activated while the motors are in storage.

5. Should storage of mechanical and electrical equipment become necessary before it can be stored at the Site, the Contractor shall provide storage in a weatherproof warehouse.

6. Materials may be stored out of doors if supported above ground surface on wood runners and protected with approved, effective and durable covers.

7. All storage and protection of materials and equipment at the Site shall be subject to the approval of the Engineer.

8. Prior to installation of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by a long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective, and shall be removed and replaced at the Contractor's expense.

9. When stored materials and equipment are moved from the storage location to the Site, the Contractor shall move or cause to be moved the items without additional compensation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 71 30 – PROTECTION AND RESTORATION OF STRUCTURES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified or otherwise required to complete the protection and restoration of all structures installed at or near the site of construction.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Contractor Responsibilities

1. The Contractor shall execute the Work to prevent damage or injury to the existing DEP structures and occupants thereof, which might result from Work or other causes, and so as not to interfere with the use, and free and safe passage to and from DEP structures and site Work.

2. The Contractor shall erect and maintain barriers, lights, fences, and other required protective devices in accordance with the Contract Documents and the NYS Building Code and the NYS Department of Transportation (NYSDOT) Standard Specifications.

3. The Contractor shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect the Work and all public and private property and facilities from damage, injury, loss or vandalism.

4. In order to prevent damage, injury or loss, the Contractor's actions shall include, but not be limited to, the following:

   a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not interfere with the progress of the Work or the plant operations, utility services, or the work of any other contractor.

   b. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft, breakage, or otherwise.

   c. Place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

   d. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by its operations, to the end that at all times the site of the work shall present a safe, orderly and workmanlike appearance.

   e. Provide barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways and other hazardous areas.

5. The Contractor shall assume full responsibility for the preservation of all public and private property or facility on or adjacent to the site. If any direct or indirect damage is done by, or on account of, any act, omission, neglect or misconduct in the execution of the Work by the Contractor, it shall be restored by the Contractor, at his or her expense, to a condition equal to that existing before the damage was done. The Contractor shall, at its expense, provide suitable drainage and erect such temporary structures as are necessary to protect the Work or materials from damage. The suspension of the Work or the granting of an extension of time from

any cause whatever shall not relieve the Contractor of the responsibility for the Work and materials.

6. Whenever any notice is required to be given by the City or the Contractor to any adjacent or adjoining landowner or other party before commencement of any Work, such notice shall be given by the Contractor within the time limitations required for such notices.

7. All structures and appurtenances shall be adequately supported and safeguarded against all damage or injury in performance of work under this Contract. The Contractor will be held responsible for any such damage or injury resulting from his operations and shall repair such damage immediately and to the satisfaction of the Engineer.

8. The Contractor shall ascertain the location of underground pipe lines, conduits and other subsurface structures in those locations where the operation of his heavy construction equipment might damage such structures. The Contractor shall either avoid such locations or provide the necessary safeguards and repair any damage quickly at his own expense.

9. The Contractor shall comply promptly with such safety regulations as may be prescribed by the Engineer or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of his employees. In the event of the Contractor's failure to comply, the Engineer may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

10. Prior to commencement of Work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property.

B. Protection of Existing Structures and Utilities

1. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as, but not limited to electric power and lighting, telephone, water, gas, storm drains, process lines, sewers and all appurtenant structures.

2. Where existing utilities and structures are indicated on the Contract Drawings, it shall be understood that all of the existing utilities and structures affecting the Work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

3. The Work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to ensure no interruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

4. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction Work, such support and protection shall be provided by the Contractor. All such Work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such Work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at this discretion, have the respective authority to provide such support or protection as may be necessary to ensure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

5. During the progress of the Work, the Contractor shall protect from injury any existing utilities or services within the Work area until, if required, they have been re-routed, disconnected or capped off. Protection and re-routing shall conform to standards established by the utilities, agencies and governing codes.

C. Underground Structures

1. Underground structures are defined to include, but not be limited to, all sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels and other existing subsurface infrastructure located within or adjacent to the Work area.

2. Underground structures known to the Engineer are shown on the Contract Drawings for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete.

3. The Contractor shall explore ahead of the trenching and excavation Work and shall uncover all obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption to the services which such structures provide. If the Contractor damages an underground structure, the Contractor shall quickly restore it to original condition at his or her own expense.

4. Necessary changes in the location of the Work may be made by the Engineer, to avoid unanticipated underground structures.

5. If the Contractor discovers utility facilities not identified in the Contract Documents or in a position different from that shown in the Contract

Documents, the Contractor shall immediately notify the Engineer and the owner of the utility facility, in writing.

D. Surface Structures:

1. Surface structures are defined as all existing buildings, structures and other facilities above the ground surface. Included with such structures are their foundations or any extension below the surface.

2. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.

E. Protection of Underground and Surface Structures

1. The Contractor shall sustain in their places and protect from direct or indirect injury all underground and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure. Before proceeding with the Work of sustaining and supporting such structure, the Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the owner of the structure.

2. The Contractor shall be responsible for all damage and expense for direct or indirect injury caused to any structure by the Work. The Contractor shall repair immediately all damage caused by the Work, to the satisfaction of the owner of the damaged structure.

3. The fact that any structure or facility is not shown on the Contract Drawings shall not relieve the Contractor of the responsibility of protecting and preserving the structure or facility.

4. All other existing surface facilities, including but not limited to, guard rails, posts, guard cables signs, poles, markers, and curbs which are temporarily removed to facilitate installation of the Work shall be replaced and restored to their original condition at the Contractor's expense once the protective and relocation work is no longer needed.

F. Restoration of Pavements

1. Restoration of pavements shall be made in conformity with the requirements of the NYC Department of Transportation Standard Highway Specifications, latest edition. These specifications may be examined at the Office of the Department of Transportation, Bureau of Highway Operations, 55 Water Street, New York, New York. The Bidder shall acquaint himself with such requirements before submitting his bid. The Contractor shall give the Department of Highways four weeks written advance notice before proceeding with final restoration of pavements, walks and curbs.

G. Coordination and Relocation of Street Utilities

1. Coordination and relocation of street utilities with utility companies shall be done in conformance with the Contract Documents and all applicable laws and regulations.

1.06 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. The Contractor shall comply with NYS Industrial Code Rule 753

2. The City shall not be liable for any costs incurred by the Contractors as a result of the compliance, non-compliance, or improper compliance of any regulations.

3. The City shall not be liable for any costs incurred by the Contractors for the support, protection and maintenance of underground facilities owned by franchised operators of such facilities.

1.07 SUBMITTALS

A. Structure Relocation Plan: For any existing structure that is to be relocated or restored, the Contractor shall submit for approval a relocation plan including plan and profile with information related to the existing and final condition of the structure with fittings, appurtenances, thrush blocks, restraints and any applicable supports, signed and sealed by a Professional Engineer licensed and registered in the State of New York.

B. Protection and Restoration Drawings: During the progress of Work, the Contractor shall keep an up-to-date set of the Protection and Restoration Drawings showing field and working drawings modifications. Immediately upon completion of Work, the Contractor shall incorporate the information contained in the Protection and Restoration Drawings into the As-Built Drawings described in Section 01 78 39 – Final Record Documents. Restoration Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for the Contractor's preparation of complete As-Built Drawings of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 71 50 – GENERAL CONSTRUCTION REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Seismic requirements
2. General mechanical requirements
3. Diagrammatic drawings
4. Ratings approximate
5. Schematic wiring diagrams
6. Electrical supply characteristics
7. Special electrical equipment requirements
8. Uniform finishes
9. Temporary support structures

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	7
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Choose an item.	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Seismic Requirements

1. The Contractor is advised that all proposed structures, non-building structures, and architectural, mechanical and non-structural electrical components and systems, including associated equipment and appurtenances furnished and installed on this project shall be subject to the requirements of the most current New York City Construction Code in conjunction with the most current seismic provisions of the International Building Code (IBC) and referenced ASCE /SEI 7-10 for earthquake loadings. In designing and detailing non-building, architectural, mechanical and electrical non-structural components and systems required to be furnished as performance type submissions, seismic forces and subsequent details shall be developed in accordance with the New York City Construction Code, Chapter 16 and the applicable chapters in ASCE 7-10 to the extent that the most stringent provisions are utilized in developing the design earthquake forces. The Contractor shall refer to the structural notes on the Structural Drawings for site, structure and non-building systems specific seismic design criteria. All calculations, seismic certifications and construction details performed and developed as part of the requirements of performance type submissions shall be prepared and sealed by a Professional Engineer (PE) licensed to practice in the State of New York.

2. Shop drawings shall indicate that the equipment, equipment pads, piping, piping hangers and supports and all anchors required for a complete installation are capable of withstanding the seismic loadings.

B. General Mechanical Requirements

1. Where piping and ducts run in areas which have hung ceilings, such piping and ducts shall be installed in the hung ceilings.

2. The Contract Drawings are in part diagrammatic and show the general arrangement of the equipment, ducts and piping included in the Contract and the approximate size and locations of the equipment. The Contractor shall follow these Drawings in laying out the Work and shall familiarize

itself with all conditions affecting the Work and the spaces in which it will be installed.

3. Connections to existing piping shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment. The Contractor shall be responsible for the exact alignment of all piping with the associated equipment and under no circumstances will pipe springing be allowed.

4. The locations of utilities, equipment, piping, gates, outlets and similar underground systems as shown on the Contract Drawings are approximate only, and the exact locations shall be approved by the Engineer during construction. The Contractor shall obtain in the field all information of the actual Work and final locations required for the placing of this Work. In case of interferences with other work or erroneous location with respect to utilities, equipment or structures, the Contractor shall furnish all labor, materials and equipment, at no additional costs to the City, to complete the Work in an approved and acceptable manner.

5. The Contractor shall take necessary field measurements to determine clearances and required sizes of equipment. The Contractor shall verify all pertinent data and dimensions. Dimensions and elevations of existing structures, equipment and piping shown on the Contract Drawings are not necessarily correct and should be considered approximate only as they are based on as-built information from past contracts. Field checking of such dimensions and elevations is necessary before submitting shop drawings for approval.

6. Until the date of Substantial Completion (or use and occupancy in accordance with Article 16 of the Standard Construction Contract), equipment shall be protected from water drippings or splashings at all times during shipment, storage and construction, by covering with waterproof material, effectively arranged. The Engineer will be the sole judge of whether equipment which has been subjected to damage by water shall be replaced or dried out. Equipment that is to be dried out shall be subject to confirmation of insulation integrity by dielectric testing. Equipment replacement or drying-out shall be at the Contractor's expense.

C. Diagrammatic Drawings

1. Various pipelines are shown on the Contract Drawings in diagram form. Where such pipelines are shown in diagram form, they shall be arranged clear of other pipelines, equipment and walking areas, and shall be accessible for maintenance. Such pipelines shall be fitted and installed in a neat and workmanlike manner in accordance with approved shop drawings. An adequate number of unions shall be provided in main pipe and branch pipe runs to facilitate dismantling or removal of pipeline sections without disturbing adjacent branch or connecting lines.

2. The final locations of valves, fittings and other such appurtenances included as a part of diagramed pipelines shall be as shown on approved shop drawings or as determined in the field by the Engineer.

3. Diagramed pipelines shall be furnished, fabricated, erected and otherwise installed to lines, elevations, locations and dimensions as shown, specified or required for a complete installation. The Contractor shall verify all dimensions shown on the Contract Drawings and shall take such field dimensions as may be necessary to properly show on shop drawings and install all diagramed pipelines.

4. In the vicinity of overhead roll-up doors and truck ways all pipe, conduit and appurtenances shall be installed a minimum of 14'-0" above the finished grade or floor elevation, and a minimum of 8'-0" above the finished grade or floor elevation in all walking areas.

5. Electrical conduits and wiring shown on the Contract Drawings are in part diagrammatic to show the general arrangement and routing of conduits and wiring and the approximate size and location of devices included in the Contract. The Contractor shall follow the intent of these drawings in laying out the Work and shall verify the spaces allocated in which the Work will be installed.

D. Ratings Approximate

1. The ratings of the motors and devices shown on the Contract Drawings and Specifications are approximate only and indicate the probable power requirements to the extent they can be determined in advance of the purchase of devices. The ratings of the devices furnished may be either increased or decreased accordingly.

2. The Contractor shall verify the exact rating of each device before performing the Work required under his Contract and modify the size of conduit, wiring and control equipment accordingly.

E. Schematic Wiring Diagrams

1. Equipment furnished under the various Specifications will require interconnecting wiring. The Contractor's shop drawings, furnished in accordance with the Specifications, shall include comprehensive schematic diagrams showing wiring of each individual piece of equipment and all interconnecting wiring. Shop drawings shall be submitted for approval of the Engineer prior to commencement of Work.

F. Electrical Supply Characteristics

1. The characteristics of the Electrical Systems available or to be provided for the operation of all electrical equipment are shown in the Contract Documents.

G. Special Electrical Equipment Requirements

1. All electrical equipment and devices manufactured and furnished under this Contract shall be of type that have been in satisfactory operation for not less than three years. Whenever similar devices or appliances are furnished, they shall be of one manufacturer and interchangeable within their ratings. If this is not feasible, the Contractor shall submit a statement for each manufacturer supplying devices, certifying that it:

   a. recommends the use of the device or devices for the specific function to be performed; and

   b. fully guarantees the satisfactory operation of the device or devices in conjunction with the other elements of the equipment.

2. Whenever standard devices or devices of a named manufacturer do not exactly fulfill the specified conditions, they shall be modified or special devices shall be furnished. All electrical devices furnished under the Contract shall be housed in metal enclosures with provisions for threaded conduit connections. The enclosures shall be designed to protect all electrical parts from local conditions.

3. Float switches, limit switches and other mechanically actuated electrical devices shall consist of an approved electrical system housed in rugged metal enclosures. They shall be adjustable without disturbing conduit connections. The switch actuating mechanism shall be mechanically and structurally correct for the required service and shall not subject the electrical parts to unnecessary stress or mechanical shock. Operating shafts shall be bushed and stuffed in dust tight cases.

4. The Contractor shall, unless otherwise directed, furnish and assemble all special lamps, indicating lamps, annunciator lamps and pilot lamps with all accessories.

5. Electrical equipment shall have a power factor of not less than 85% under rated load conditions. Electrical equipment with a power factor less than 85% shall be corrected to at least 85% under rated load conditions. Installed power factor corrective devices shall be switched with utilization equipment.

6. Wire terminals on manufactured assemblies such as switchboards, bench boards, control panels, alarm boards, and motor control equipment shall consist of cup terminals, pronged washers, compression type solderless connectors or pressure type terminals furnished on devices.

7. All control and indication wires within motor control centers and other panels and cabinets shall be terminated on terminal blocks provided with marking strips for wire designation. The manufacturer shall identify all wires on the marking strips. All field wires will be terminated and identified by the Contractor.

8. Provision shall be made for wire and cables installed at the plant site to be terminated by the Contractor with approved solderless copper alloy lugs.

Lugs may be of the compression type, clamp type or screw type with internal pressure bar, or may be pressure tool applied solderless connectors. Pressure tool applied solderless connectors for wires 250 MCM or larger shall have long barrels to allow double indentation.

9. The Contractor shall consult with the manufacturer or its representative to ensure that the electrical items will have a shelf life of at least ten (10) years. Polychlorinated biphenyls (PCBs) shall not be used in any equipment on this project. Manufacturers shall have maintenance facilities in the New York City metropolitan area.

   a. Nameplates and warning signs shall be provided. Nameplates shall be 1/16 inch thick laminated plastic, white with a black core for black engraved lettering, and shall have beveled edges. They shall be provided for all controls on all power control panels and cabinets, lighting cabinets and operating devices, marked and positioned on the front panel as approved by the Engineer. Mounting shall be by stainless steel screws through predrilled nameplate holes, one at each end of the plate. The Contractor shall provide, as required or as directed, all warning signs required for the safe operation of the equipment. Such warning signs shall be of substantial material, porcelain enameled, of suitable thickness and as approved by the Engineer. All components within electrical control panels, switchgear and assemblies shall be identified with engraved stainless steel tags rigidly mounted at or near the respective device.

H. Uniform Finishes

1. A uniform finish shall be used for all hardware, metallic nameplates and similar exposed metal parts used on any equipment or group of equipment and, as far as possible, the same finish shall be used for all such equipment items.

I. Temporary Support Structures

1. The Contract Documents include suggested design and construction requirements for the temporary support structures. The Contractor may submit an alternate design of any temporary support structure for approval by the Engineer. The Engineer may accept or reject the alternate design if the structure is not considered temporary or if it may impose instability to the adjacent existing structure due to lateral and vertical movements. The alternate design of the temporary support shall be performed, signed and sealed by a Professional Engineer registered in the State of New York who is qualified to determine the extent of work necessary to satisfy the temporary support requirements.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 CHOOSE AN ITEM.

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 73 12 – MAINTENANCE OF OPERATIONS AND CONSTRUCTION STAGING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Maintenance of Site operations

B. General criteria and restrictions

C. Construction staging

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 32 10 – Progress Scheduling

C. Section 01 35 55 – Site Security

D. Section 01 56 00 – Temporary Barriers and Enclosures

E. Section 01 57 00 – Temporary Controls

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Maintenance of Site Operations

1. The Contractor shall perform its work in a manner such that the DEP can keep the existing Site/facility in continuous dependable operation. Any temporary work that may be required to maintain the site/facility in operation shall be furnished by the Contractor at the direction of the Engineer at no extra cost to the DEP.

2. The Contractor shall keep the Engineer and designated representative of the facility/Site informed of any Work that may interfere with normal operations. The Engineer and the facility/site representative must receive a written request at least 15 days in advance of proposed work.

a. The CPM schedule maintained by the Contractor under Section 01 32 10 – Progress Scheduling shall not serve as prior notice. No work shall proceed prior to the written approval of DEP.

3. Unless otherwise permitted by the facility/Site representative, no existing valves or equipment shall be operated by the Contractor.

4. The employees of the Contractor or its Subcontractors may be prohibited from entering or using some areas of the Site/facility.

B. General Criteria and Restrictions

1. The following general criteria and restrictions shall apply to the Work except where otherwise noted in the Contract:

a. When the connection of a new pipeline to an existing structure or pipeline requires a shutdown of the existing structure or pipeline, the new pipeline except for the final connection shall be tested prior to proceeding with the shutdown. When the final connection is completed, the new pipeline shall be tested again in its entirety.

b. The Contractor shall provide all pumps, piping, valves, etc., as necessary to dewater all conduits, channels, and pipes directly to a location approved by the Engineer.

c. The Contractor shall provide all pumps, piping, valves, etc., as necessary, to remove unused chemicals from all pipes as described herein.

d. The Contractor shall flush and clean all process channels, conduits, manholes, and tanks after they have been removed from service.

e. Any modification to, relocation of, connection to or shutdown of an existing tank, vessel, conduit, channel, pipe, etc. shall not be scheduled or occur prior to the Engineer's written approval. The Contractor is advised that the conduits, channels and tanks may contain accumulations of putrescible materials which will remain on the walls and inverts. These materials emit noxious, odorous and hazardous gases such as hydrogen sulfide and methane. The Contractor is advised to ventilate and test the air of all confined spaces prior to entry.

f. The Contractor is advised that existing valves, gates and other devices shall be considered as inoperable and subject to leaking. The Contractor shall be responsible for designing, furnishing, installing and removing all temporary devices, stop logs, plugs or bulkheads necessary to isolate or dewater pipes, channels, conduits, or tanks to perform the Work.

g. The Contractors shall install and maintain temporary drainage and containment, to the satisfaction of the Engineer, where the existing drainage and containment has been removed due to construction progress until the permanent replacement drainage and containment system has been installed.

h. The Contractor shall coordinate its activities with the other contractors on the site so as to comply with the provisions of these specifications and their intent.

2. The following general restrictions shall be applied to all equipment and appurtenant utility systems:

a. The restrictions provided herein serve to maintain the existing Site facilities in continuous operation and to coordinate with other construction activities at the Site in accordance with the requirements of the authorities having jurisdiction.

b. Existing fire suppression piping at / near Work Sites shall be operational at all times until replaced.

c. Plumbing Facilities: All building plumbing systems such as sanitary facilities, roof and floor drains, pumping, etc., shall be maintained until turned over by site operations for demolition.

d. Storm Drainage: Storm drainage on the site shall be operational at all times. If necessary, the Contractor shall pump between manholes during the installation of new piping or underground utilities. Roof drainage shall be maintained at all times and no roof shall be permitted to accumulate standing water.

e. All site drainage flows shall not be interrupted.

f. Power, Light and Communication Systems: Electric power, lighting service, and communications systems shall be maintained in uninterrupted operation in all areas that remain in operation. Individual units may be disconnected as required for replacement or relocation.

g. The existing CCTV system must remain operational throughout the life of this contract. If any Work in this Contract requires the system to be down temporarily, the downtime must be coordinated and scheduled with BPS via email before performing the work. At the discretion of BPS, downtime may require the Contractor to provide a temporary Live View Technologies (LVT) mobile surveillance unit until the system is back online.

h. Sump Pumps and Sumps: All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps. Interim piping, power and controls shall be provided as required.

i. Drainage Pipes and Conduits:

1) Unless otherwise specified, the contents of all pipes, conduits, pits or other liquid containing structures shall be transferred to a location approved by the Engineer using hoses, piping or pumps if hydraulic conditions so require them. The Contractor shall provide the pumps, piping and hoses.

2) If a drain is not available on the pipe to be drained, then a wet tap shall be made using a tapping saddle and valve. No uncontrolled spillage of a pipe's contents shall be allowed, nor shall a pipe's contents be discharged to a sump.

3) Any spillage shall be immediately washed down and the floor drains, sumps and sump pump discharge piping flushed out to prevent clogging and odors.

j. Temporary Partitions and Enclosures: The Contractor shall provide temporary partitions and enclosures as required by the contract documents where necessary to maintain dust-free, heated and ventilated spaces in areas which are adjacent to his work and which must be kept operational by Site operations personnel.

k. Seal Water and Service Water Piping: A supply of seal and service water and the necessary connections to existing equipment shall be maintained during construction. Interim piping shall be provided as required.

3. The following requirements shall be adhered to in development of the circulation plan to be submitted in accordance with the provisions of this Section.
   a. Comply with, at a minimum, all requirements of the following:
      1) Section 01 14 00 – Work Restrictions,
      2) Section 01 32 10 – Progress Scheduling,
      3) Section 01 35 55 – Site Security,
      4) Section 01 56 00 – Temporary Barriers and Enclosures, and
      5) Section 01 57 00 – Temporary Controls.
   b. Construction-related vehicles and activities shall not impede or otherwise adversely affect the flow of regular traffic traveling on the roads leading to and adjacent to the Work location.
      1) Construction-related vehicles and activities shall be understood as including vehicles operated and activities undertaken by the Contractor (including the Contractor's employees, Subcontractors, and visitors). Regular traffic shall be understood as referring to all vehicles other than construction-related vehicles.
      2) Personal vehicles are prohibited on site.
   c. Perform the Work required in this Contract in accordance with applicable traffic and safety rules, regulations, ordinances, and permit conditions.
   d. The Contractor is responsible for safety in sections of roadway closed for roadwork. For temporary fall protection requirements, refer to Section 01 56 00 – Temporary Barriers and Enclosures. Maximum fence section removal at the top of the Downstream West Training Wall shall be as determined by the Resident Engineer.
   e. Protect all open excavations per Section 01 56 00 – Temporary Barriers and Enclosures and, if required, cover open excavations with steel plates after working hours.
4. Any temporary work that may be needed to maintain the Site facilities in operation, and that is made necessary by the requirements of the Contract or by the Contractor's activities, shall be provided by the Contractor as specified under the Contract Documents or at the direction of the Engineer at no extra cost to DEP.
5. The Contractor shall not remove any items from service without written permission from DEP. Upon receiving written approval from the City, the Contractor shall proceed with the Work and shall proceed continuously until the Work is completed, tested, and made ready for operation.

C. Construction Staging

1. The Work included under this Contract, shall be performed in accordance with the Contract Documents. Further, the Contractor shall submit a comprehensive work schedule to the Engineer to demonstrate that it shall rigidly adhere to these requirements.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 73 17 – INSTALLATION OF EQUIPMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to install equipment.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	1
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	5
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General:

1. This Section includes the following:
   a. Concrete foundations, bases, dowels and anchor bolts.
   b. Sleeves, recesses, openings, chases and related concrete installation items.
   c. Supervision by manufacturers' representatives.
   d. Workmanship.
   e. Clearance and safeguards.
   f. Alignment and leveling.
   g. Cutting and patching.
   h. Lubrication.
   i. Maintenance of installed equipment.
   j. Protection of installed equipment.
2. The Contractor shall have adequate resources on site, including labor, materials, construction tools and equipment, to successfully perform the Work.
3. The Contractor shall be responsible for locating, aligning and leveling all equipment and shall employ a surveyor licensed in the State of New York to set all lines and levels of equipment to the accuracies specified in the Contract Documents.
4. Manufacturer's complete and official installation instructions, including permissible tolerances, shall be furnished in duplicate with each unit of equipment or set of identical units.
5. All equipment shall be installed in accordance with the approved shop drawings (including manufacturer's specifications, drawings, and tolerances) and under the direct supervision of the required manufacturer's representative. In no instance shall the directions of the manufacturer's representative contravene the Engineer's direction.
6. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the approved shop drawings unless directed otherwise by the Engineer during installation.
7. As a condition precedent to the acceptance of equipment installed and operating, the Contractor shall provide the Engineer with written certification, obtained from each company manufacturing equipment for the Work that the equipment is installed and does operate in accordance with the Contract Documents and manufacturer's recommendations.

B. Concrete Foundations, Bases, Dowels and Anchor Bolts:

1. The Contractor shall provide all reinforced concrete foundations, bases, dowels, and anchor bolts for all equipment and piping furnished under this Contract.

    a. All reinforced concrete bases and supports shall be steel reinforced and dowelled to floor slabs. Where possible, dowels shall be in place before new floor slab concrete is placed.

2. Where not explicitly stated in the Contract Documents, the Contractor shall utilize foundation bolt drawings or templates for the installation of equipment requiring concrete bases.

3. Dowelling into existing work shall be provided under this Contract.

    a. Anchor bolts penetrating into existing reinforced concrete work shall be drilled in place, shall be of the expansion type, and shall have sufficient length and configuration to resist the imposed loadings when installed in accordance with the Contract Documents, the manufacturer's recommendations, and as approved by the Engineer. Dowels and anchor bolts in existing concrete shall be installed using a bonding agent approved by the Engineer.

    b. All concrete bases for equipment shall be treated with an approved sealer to prevent oil and grease from seeping into the concrete.

4. Installation of reinforced concrete bases and the installation of dowels and anchor bolts into existing and new reinforced concrete work shall be in accordance with the Contract Documents and the manufacturer's recommendations, and shall be subject to the approval of the Engineer.

C. Sleeves, Recesses, Openings, Chases and Related Concrete Installation Items:

1. The Contractor shall make provisions as shown on the Contract Drawings, specified, and/or otherwise required for sleeves, recesses, openings, chases, and related items, for installation of the equipment and materials

2. When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors and other similar work in floors or walls of buildings and structures, they shall be promptly installed in conformity with the Contract Documents. The Contractor shall arrange the work in strict conformity with the approved construction schedule and avoid interferences with the work of other contractors.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Concrete foundations for equipment shall be of approved design and shall be adequate in size, suitable for the equipment erected thereon, properly reinforced, and tied into floor slabs by means of reinforcing bars or dowels. Foundation bolts of ample size and strength shall be provided and properly positioned by means of suitable templates and secured during placement of concrete. Foundations shall be built and bolts installed in accordance with the manufacturers approved drawings.

B. Before mounting equipment on a foundation, the Contractor shall clean the top surface; if necessary, rough it with a star chisel and clean again; and clean out all foundation bolt sleeves.

1. The Contractor shall provide a sufficient number of shims about 2-in. wide and 4-in. long, and of a varying thickness from ⅛-in. to ½-in.. A combination of these shims shall be placed next to each foundation bolt to bring the bottom of the bedplate or frame about 1/8 inch above the final setting. The equipment shall be lowered by changing the combination of shims. The Contractor shall use brass shim stock of various thicknesses, and continue to level the equipment a little at a time and in rotation until it is at the correct elevation in both directions.

2. When the equipment is level, the Contractor shall tighten down on the foundation bolts a little at a time, in rotation, to make certain the

equipment remains level and does not shift on the shims. A preliminary alignment check shall be made before grout is placed.

C. Equipment shall be set, aligned and assembled in conformance with manufacturer's instructions. Runout tolerances by dial indicator method of alignment shall be plus or minus 0.002-in. or as directed by the manufacturer, whichever is more stringent.

D. All blocking, wedges, shims, filling pieces, or other materials required for the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except the shims, which may be left in place with the approval of the Engineer. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

E. Each piece of equipment or supporting base, bearing on concrete foundations, shall be bedded in grout. The Contractor shall provide a minimum of 1½-in. thick grouting under the entire base plate supporting each pump, motor drive unit, and other equipment. Grouting shall be as specified in the respective equipment specification section(s) and as approved by the Engineer.

F. When motors are shipped separately from driven equipment, the motors shall be received, stored, have insulation resistance tested once a month, and the reports submitted to the Engineer. Space heaters shall be supplied in all enclosures being utilized for storage of motors. After driven equipment is set, the motors shall be set, mounted, shimmed, mill righted, coupled and connected complete.

G. Moving parts shall be rotated a minimum of once weekly before and after installation to ensure proper lubrication and to avoid metal-to-metal welding and to prevent "flat-spotting" of bearings.

H. Anchor and expansion bolts shall be furnished by the Contractor as specified and required by this Contract Documents.

I. At threaded connections, a molybdenum disulfide anti-seize compound shall be applied to all threads in mechanical connections such as bolts, studs, cap screws, tubing, etc., unless otherwise indicated.

3.02 IMPLEMENTATION

A. Workmanship:

1. The following erection details are not intended to be all-inclusive, but only to cover some of the important practices. In all cases, only the best methods known to the trades are to be employed.

2. Only those workers qualified in the handling, setting, alignment, leveling and adjustment of the type of equipment supplied shall be employed in the Work.

3. An oil bath heater shall always be used to expand couplings, gears, etc. They shall not be forced or driven on equipment shafts, nor shall they be subjected to an open flame or torch.

4. Wedging shall not be permitted. Only the least number of flat shims are to be used in leveling equipment (shims are to be clean and free of slag). All shims, filling pieces, keys packing, red or white lead grout, or other materials necessary to properly align, level and secure apparatus in place shall be furnished by the Contractor. All parts intended to be plumb or level must be proven exactly so. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

5. Proper tools shall be used in the assembly of equipment and materials to prevent marring the surface of shafts, nuts, or other parts.

6. Connections requiring gaskets shall be tightened evenly all around to ensure uniform stress over the entire gasket area.

7. No equipment and materials shall be altered or repaired, and no burning or welding will be permitted on any parts having machined surfaces, except by written permission of the Engineer.

8. No rigging shall be done from any structure without the permission of the Engineer, and the Contractor shall be completely responsible for any damage to the structure due to its operations.

9. Only such equipment and materials that shall not damage the structure or equipment and materials shall be used on the Work.

10. The Contractor shall be responsible for the exact alignment of equipment with associated piping and, under no circumstances, will "pipe springing" be allowed.

11. Misaligned holes shall be reamed, as excessive driving of bolts or keys will not be permitted.

12. The Contractor shall furnish and install all necessary plugs in lubrication holes to prevent entry of foreign material.

B. Clearances and safeguards:

1. All devices, equipment, and systems furnished under this Contract shall be fabricated and installed so that the necessary and required clearances are provided for operation, maintenance, repair, and replacement. It is the Contractor's responsibility to review the Contract Drawings and ensure that the necessary and required clearances are available, and it is the Contractor's responsibility to notify the Engineer in the event that such clearances cannot be provided based on the Contract Documents.

2. The construction arrangement, assembly locations, and guarding of all equipment shall conform to the latest ANSI safety practices, the New York State Industrial Code, and all standards specified in the Contract Documents.

C. Alignment and leveling:

1. All couplings shall be aligned while the equipment is free from all external loads.
2. Both angular and parallel alignment shall be checked, and the degree of misalignment shall be recorded and submitted to the Engineer.
3. Dial indicators shall be used for the checking of angular and parallel alignment. During rotation of the held couplings in performance of this test, they shall be maintained in the same relative position, and the dial indicator readings shall be taken at the same place on the circumference of the coupling.
4. Misalignment shall not exceed the manufacturer's tolerances.

D. Cutting and patching:

1. Whenever it becomes necessary to cut existing work, the location and size of cut and method of cutting shall be as approved by the Engineer and adjacent work shall not be damaged. On completion of the cutting, all affected areas shall be restored satisfactorily by qualified workers.

E. Lubrication:

1. All lubrication shall be performed by the Contractor in accordance with the lubricant specifications and directions furnished by the manufacturer.
   a. If required by the manufacturer's specifications and/or instructions, the Contractor shall provide lubrication of equipment while in storage, from delivery to installation.
2. The Contractor shall furnish required lubricants for the equipment until it is accepted.
3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

3.03 FIELD TESTING / QUALITY CONTROL

A. Supervision by Manufacturer's Representative: The Contractor shall provide the services of qualified technical representatives of the equipment manufacturers who shall adequately supervise, in person and on site, the installation and testing of all equipment furnished under this Contract and instruct the Contractor's personnel and City operating personnel on maintenance and operation of its equipment.

1. The manufacturers' representatives shall devote, at a minimum, the entire amount of time specified under the relevant Specification sections for the equipment. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

2. The manufacturers' representatives shall sign in and out in a log for this purpose kept by the Engineer on every occasion they are on the Site and shall indicate time of arrival, departure, and the purpose of their visit.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. During the period between installation and substantial completion, the Contractor shall maintain all equipment in accordance with the equipment manufacturer's instructions as approved by the Engineer.

1. The Contractor shall also provide protection of installed equipment, as required, to prevent damage and remove protection devices/facilities, when no longer needed, prior to completion of work:

a. Projections such as wall corners, jambs, sills and soffits of openings, shall be covered in areas used for traffic and for passage of products in subsequent work.

b. Equipment for which shop finish paint is required shall be protected in the shop and during transportation and installation to prevent injury and abrasion. Such equipment shall be scheduled for installation when a building is considered enclosed and as late as possible in the construction schedule. However, maintenance of schedules may require the installation of such equipment in unheated areas and in areas where masonry work, concrete finishing, steel erection, painting, and other work will be in progress.

1) Shop finished Work shall be protected during and after installation by waterproof wrappings sealed to prevent condensation on surfaces. Wrappings shall be sufficient to protect surfaces from damage by drippings from masonry and painting work, and additional covering or sheathing shall be provided to protect equipment from contact damage that might result from work in progress in adjacent areas.

2) Prior to Substantial Completion (or use and occupancy in accordance with Article 16 of the Standard Construction Contract), wrappings and coverings shall be removed, equipment shall be cleaned and all scratches and abrasions shall be refinished.

END OF SECTION

SECTION 01 74 17 – CLEANING AND SITE MAINTENANCE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements of Regulatory Agencies

B. Scheduling of Cleaning Operations

C. Cleaning Materials

D. Site Maintenance Requirements

E. Snow and Ice Removal

F. Disposal of Waste Materials

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 74 20 - Construction Waste Management

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall collect and dispose of all debris and rubbish resulting from its Work. Cleaning shall be performed daily and trash removal shall be performed weekly, or more frequently, as directed by the Engineer, whenever the debris or rubbish interferes with the Work under the Contract, plant operations or presents a fire hazard and as noted below.

2. Cleaning Work shall conform to the requirements of Section 01 74 20 - Construction Waste Management.

B. Requirements of Regulatory Agencies

1. In addition to the requirements specified herein, the Contractor shall maintain the cleanliness of the Work areas and surrounding premises within the Work limits so as to comply with federal, state, and local fire and safety laws, ordinances, codes and regulations.

2. The Contractor shall comply with all federal, state and local anti-pollution laws, ordinances, codes and regulations when disposing of waste materials, debris, rubbish, snow and ice.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Cleaning Materials

1. The Contractor shall use only cleaning materials recommended by the manufacturer of surface to be cleaned.

2. Each type of cleaning material shall be used on only those surfaces recommended by the cleaning material manufacturer.

3. Use only cleaning materials which will not create hazards to health or damage property.

B. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Scheduling of Cleaning Operations

1. The Contractor shall schedule trash removal and cleaning operations as necessary to comply with the criteria listed below, at a minimum, and at intervals as directed by the Engineer.

a. So that dust, wash water or other contaminants generated during construction do not damage or mar painted or finished surfaces.

b. To prevent accumulation of dust, dirt, debris, rubbish and waste materials on or within the Work Site or on the premises surrounding the Work Site.

B. Site Maintenance Requirements

1. The Contractor shall keep the Work and surrounding premises within Work limits, including its staging and storage areas, free of accumulations of dirt, dust, waste materials, debris and rubbish.

2. The Contractor shall keep dust generating areas wetted down.

3. The Contractor shall provide suitable containers in sufficient quantity for storage of waste materials, debris and rubbish.

4. The Contractor shall dispose of waste materials and surplus materials off site at a regulatory-approved disposal site at intervals as needed.

3.02 IMPLEMENTATION

A. Snow and Ice Removal

1. The Contractor shall remove snow and ice from the following areas:

a. The sidewalks and parking areas associated with the Contractor's and Engineer's field office and security structures.

b. All construction access roads.

1) Any Facility walkways which cannot be accessed by the Facility's snow removal equipment due to construction activities.

2) Any additional areas designated by the Engineer.

c. Snow and ice removal shall be before 7:00 AM whenever there is a snowfall storm or icing precipitation and before 7:00 AM on the day following the termination of the snowfall storm or icing precipitation.

d. When directed by the Resident Engineer, the Contractor shall begin snow and/or ice removal immediately (within one (1) hour of the Resident Engineer's directive to proceed).

e. Spreading of Salt and Sand

1) The Contractor shall furnish all labor, tools, equipment, and materials necessary to perform the following services when requested and authorized in writing by the Resident Engineer:

a) Spread calcium chloride over all areas of the Engineer's parking lot and spread sand on the steps and platforms at the entrances to the Engineer's field office.

b) Spread salt and sand prior to a snowstorm or icing precipitation.

c) Upon termination of a snowstorm, the Contractor shall remove all sand from the steps and platforms at the entrances to the Engineer's field office.

2) Disposal of sand shall be the responsibility of the Contractor.

B. Disposal of Waste Materials

1. The Contractor shall not burn or bury rubbish and waste materials on the Site.

2. The Contractor shall not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or on the ground.

3. The Contractor shall not discharge any wastes into waterways.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Final Cleaning

1. At the completion of the Work, the Contractor shall remove all rubbish from and about the Site of the Work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which it or any of its Subcontractors may have used in the performance of the Work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

2. The Contractor shall thoroughly clean all materials, equipment and structures in it Work areas so as to leave the Work in a clean and new appearing condition.

   a. All marred surfaces shall be touched up to match adjacent surfaces;

   b. Dirty filters and burned-out lights shall be replaced as required;

   c. All glass surfaces shall be cleaned; and

   d. Floors shall be cleaned and polished.

3. The Contractor shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering in its Work areas.

4. The Contractor shall remove paint from and clean and restore all equipment and material nameplates, labels and other identification markings in its Work areas.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 74 20 – CONSTRUCTION WASTE MANAGEMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the requirements for construction waste management for a project that requires measurable quantities and tracking documentation.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Implementation	7
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 02 24 20 – Soil Sampling and Analysis

1.04 REFERENCES

A. Diversion: To remove, or have removed, from the site for recycling, reuse or salvage, material that might otherwise be sent to a landfill. Diversion does not include using the material as alternative daily cover at a landfill site, nor does it include burning, incinerating or thermally destroying waste.

B. Electronic Waste as defined by:

1. 40 CFR Parts 260 – 272;
2. 6 NYCRR Part 370: Hazardous Waste Management System – General
3. 6 NYCRR Part 371: Identification and Listing of Hazardous Waste;
4. 6 NYCRR Part 372: Standards Applicable to Generators of Hazardous Waste;
5. The Federal CRT Rule [Federal Register: July 28, 2006 (Volume 71, Number 145)];
6. The Federal Circuit Board Rule [Federal Register: May 26, 1998 (Volume 63, Number 100)];
7. Environmental Conservation Law Article 27 Title 26 – Electronic Equipment Recycling and Reuse.

C. Hazardous Waste: Material shall be considered a hazardous waste when it exhibits any of the following: ignitability, corrosivity, reactivity, or toxicity for Volatile Organic Compounds (VOCs), semi-VOCs, metals, pesticides, or herbicides, as defined in 6 NYCRR Part 371 or 40 CFR Section 261. Under New York State (NYS) regulations, a material that contains 50 ppm or greater of PCBs is considered a hazardous waste. The Environmental Protection Agency (EPA) considers a material that contains 50 ppm or greater of PCBs to be a Toxic Substances Control Act (TSCA)-regulated waste. All hazardous waste shall be considered unsuitable, and shall be disposed of at an approved permitted hazardous waste landfill.

D. Universal Waste as defined by:

1. 40 CFR Part 273: Standards for Universal Waste Management;
2. 6 NYCRR Subpart 374-3: Standards for Universal Waste;
3. 6 NYCRR 373-3.10: Interim Status Standards for Owners and Operators of Hazardous Waste Facilities, Tank Systems;
4. Use of Enforcement Discretion for Discarded Mercury-Containing Equipment, NYS DEC Commissioners Policy (CP-39);
5. Mercury Added Consumer Products Law (Chapter 145 Laws of New York 2004 and Chapter 676 Laws of New York 2005);
6. 49 CFR Part 172: Hazardous Materials Regulations.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Regulatory Requirements: Contractor(s) shall meet all applicable federal, state, and local regulatory requirements as well as DEP Environmental Health and Safety (EHS) Policies and Procedures for the on-site management, transportation, and recycling or disposal of all construction waste materials generated during construction.

1.07 SUBMITTALS

A. Construction Waste Management Plan: The Contractor shall be responsible for the development and implementation of the Construction Waste Management Plan ("Plan") for the Project. Waste and recyclable materials shall be collected, sorted, and deposited in accordance with the approved Plan.

1. The Contractor shall prepare and submit the Plan for review and approval by the Engineer 30 days after receipt of Notice to Proceed and prior to the removal of any construction waste from the Project site. The Plan shall be based on the construction waste recycling percentage goal ("percentage goal") established via the Design Sustainability Program. The percentage goal of 100% end-of-Project rates of salvage/recycling of construction waste is detailed in the Construction Waste Estimate Report ("CWER") generated by the Design Engineer and is included in the bid exhibit documents. The final CWER is expressly excluded from and is not a part of this Contract and is available for information purposes only. Copies of this document have been provided on CD for reference.

2. The Plan shall contain the following:

a. Construction and Demolition Diversion: Estimate of the total proposed construction and demolition waste to be generated, and the percentage of this waste to be diverted from landfill (including types and quantities) during prosecution of the Work. Identify at least five materials (both structural and non-structural) targeted for diversion. Approximate a percentage of the overall Project waste that these materials represent. This diversion shall be developed based on the estimates included in the CWER. Percent diverted from landfill shall be calculated using the following formula:

$$Diversion\ Percentage = \frac{Total\ Estimated\ Waste\ Diverted\ from\ Landfill}{Total\ Estimated\ Waste\ Produced\ by\ Project}\ x\ 100$$

The estimates shall be calculated by weight (tons). The list of construction waste materials shall be specific to the project site and may include, but not be limited to, the following materials:

1) Aluminum
2) Cardboard
3) Cast iron
4) Cement
5) Clean dimensional wood
6) Concrete – reinforced cast-in-place and cyclopean masonry
7) Copper wiring
8) Electronic waste
9) Electrical wires
10) EPDM rubber
11) Equipment
12) Extruded polystyrene
13) Fencing
14) FRP
15) Grout
16) HDPE
17) HVAC/Ductwork
18) Lighting
19) Metals from rebar, sheetrock studs, framing, etc.
20) Paints, solvents, and other hazardous fluids
21) Piping
22) Plastics
23) Plumbing fixtures
24) Plywood
25) PVC
26) Recyclable office wastes such as paper and toner and ink cartridges
27) Roofing
28) Steel
29) Stone

30) Valves

31) Wood

b. Soil Diversion: Estimate of the total proposed excavated soil to be generated, and the percentage of this soil to be diverted from landfill via onsite and/or offsite reuse (including types and quantities) during prosecution of the Work. Soil diversion may be achieved through onsite or offsite reuse. Whenever possible, reuse of excess excavated soils on site should be prioritized over off site reuse. Refer to Section 02 24 20 - Soil Sampling and Analysis for sampling and regulatory requirements. The estimates shall be calculated by weight (tons). Percentage of soil diverted from landfill shall be calculated using the following formula:

$$Soil\ Diversion = \frac{Total\ Estimated\ Soil\ Diverted\ from\ Landfill}{Total\ Estimated\ Soil\ Produced\ by\ Project}\ x\ 100$$

c. Materials handling procedures. A description of the means by which any waste materials will be protected from contamination via segregation, and a description of the means to be employed in recycling the above materials consistent with the requirements for acceptance by recycling processors to be utilized and the New York City Department of Sanitation (NYCDOS). Hazardous waste, universal waste, and used oil must be separated and stored in their own dedicated storage areas and managed in compliance with NYSDEC Hazardous Waste, Universal Waste and Used Oil Regulations, USDOT 49 CFR Hazardous Material Transportation Regulations, and in accordance with DEP EHS Policies and Procedures.

d. List of waste transporters, transfer stations, beneficial use facilities, disposal facilities and recyclers with addresses, phone numbers, and permits, which the Contractor intends to utilize during the Project for the purpose of complying with the Construction Waste Management Plan. The Plan should list where both recyclable and non-recyclable materials will be recycled, reused, or disposed, and how those materials will be transported.

3. Hazardous wastes: The Plan shall specifically note the proper method of disposal for anticipated hazardous wastes or potentially hazardous wastes as detailed in Section 01 35 45 – Hazardous Materials Control. The Plan shall state that the hazardous waste transporter must hold a current New York State Part 364 Waste Transporter Permit in accordance with NYCRR Part 364. The permit must authorize the transporter to take the hazardous waste to the Transportation, Storage and Disposal Facility (TSDF)

identified in the permit. The Construction Waste Management Plan must state that the hazardous waste will be transported in compliance with USDOT Hazardous Materials Transportation regulations in Title 49 of the CFR.

4. Non-hazardous wastes: The Plan shall specifically note the proper method of removal of anticipated non-hazardous waste. The Plan shall state the transporter must hold a current New York State Part 364 Waste Transporter Permit to transport the waste to a TSDF that accepts non-hazardous waste.

5. The Plan shall include the method of recycling office materials such as clean white paper, mixed paper, toner cartridges for laser printers, copiers, fax machines, and other electronic waste. Each item shall be recycled in accordance with the manufacturer's instructions.

6. The Plan shall include the coordination of product deliveries to designated prepared areas in order to minimize site storage time and potential damage to stored materials and the return of packing materials, where economically feasible.

B. Final Submittal: The Contractor shall submit a Construction Waste Management Final Summary Report ("Final Summary Report") upon Substantial Completion. The Summary Report should tabulate total waste material, quantities diverted from landfill and means by which it is diverted, and shall include a statement noting that the recycling/diversion goal outlined in the CWER has been met.

C. Monthly Submittals: Monthly waste and soil generation/diversion/disposal data shall be tracked in accordance with Section 01 35 27 – Environmental Health and Safety Requirements, paragraph 1.07.C Monthly Contractor EHS Report.

D. Project Meetings: The Construction Waste Management Plan and implementation shall be discussed at the following meetings:

1. Pre-construction Meeting

2. Regular monthly Progress Meetings

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall designate separate receiving/storage areas for delivered materials and equipment to minimize waste due to excessive materials mishandling, misapplication, weather and other damage.

1. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.

2. Promptly return damaged shipments or incorrect orders to manufacturer.

3. For materials or equipment to be reused or salvaged, use special care in removal, storage and reinstallation to insure proper function in completed work.

B. Periodically inspect stored products to assure products are undamaged and are maintained under required conditions.

C. Training of employees for handling and storing waste materials shall be in accordance with DEP EHS Policies and Procedures.

D. The requirements herein shall supersede any conflicting statements wherever they may appear in the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. The Contractor shall be responsible for the implementation of the approved Construction Waste Management Plan. The Contractor shall be responsible for the provision of containers and the removal of all waste, non-returned surplus materials, and debris from the site in accordance with the Plan and in compliance with all federal, state, and local regulations, as well as DEP EHS Policies and Procedures.

B. Monies received for recycling and/or salvaged materials shall remain with the Contractor, except for items specifically identified in the Contract Documents.

C. Contractor(s) shall use construction and demolition methods and processes to ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. When encountered as part of the Work, the Contractor shall dispose of construction waste by recycling methods in accordance with the NYC Recycling Law: Local Law 19 (1989) and Local Law 87 (1992), and NYC's Commercial Recycling Regulations: Rules Governing the Recycling of Private Carter-Collected Waste (September 1993).

All material to be recycled shall be separated from normal refuse, per NYCDOS Rules. Material not required to be recycled shall be disposed of by the Contractor as specified and in accordance with all applicable federal, state, and local regulations and DEP EHS Policies and Procedures.

E. When encountered as part of the Work for sites outside New York City, the Contractor shall dispose of construction waste by recycling methods in accordance with all federal, state, and local regulations and DEP EHS Policies and Procedures.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 75 10 – PRELIMINARY AND FINAL FIELD TESTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Field Test Schedule and Updates
2. System Test Procedures
3. Contractor Responsibilities
4. Preliminary Field Tests of Equipment
5. Preliminary Field Tests of Systems
6. Final Field Tests of Equipment
7. Final Field Tests of Systems

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 - Progress Scheduling

B. Section 01 43 05 - Contractor's Work Quality

1.04 REFERENCES

A. "System": A System, for purposes of testing, is defined as consisting of the component equipment, valves, piping, instrumentation, controls, ducts, accessories, etc., which are required for the proper functioning of each piece of equipment and the System as a whole. The purpose of the System testing is to demonstrate the capability of the equipment, interconnections and accessories to perform as specified.

1.05 DESCRIPTION

A. All field tests, including equipment and Systems tests, shall be performed in accordance with the requirements of this Section. The requirements contained herein shall apply, whether or not this Section is specifically referenced elsewhere in the Contract Documents.

B. Field tests shall include preliminary and final field tests of equipment and Systems.

1. All tests shall be performed in strict compliance with applicable manufacturer's and Engineer's instructions.

2. No testing of Systems shall commence before the associated pipelines have been satisfactorily tested for leakage in accordance with the requirements of the Contract.

C. For a successful test of equipment or System, the equipment or System shall operate trouble free for the continuous period of time, as specified below. If there are any interruptions in operation during the test, the test shall be repeated until the equipment or System operates trouble free for the specified time period.

D. System Test Procedures:

1. The following are to be considered a part of all System test procedures:

a. Variable capacity equipment shall be operated over the full capacity range of the maximum, minimum and at least three (3) intermediate points for a minimum of 30 minutes at each point.

b. Multiple equipment groupings are to be operated both singly and together up to the maximum capacity of the System.

c. Header and cross connected groups of units are to be operated using all connecting combinations.

d. All equipment items, including standby units are to be tested. It may be necessary to repeat System tests at maximum condition to insure that standby units are included in System tests.

e. Each operating unit shall be run for at least one hour alone (equipment field test) and for four hours as a System at maximum capacity after reaching stable operating conditions.

f. All equipment, interconnecting piping and accessories are to be checked for leakage and specified rate performance capability. Instrumentation and controls shall be tested as part of the equipment.

E. Contractor Responsibilities:

1. For preliminary field tests of equipment and Systems, the Contractor shall furnish all labor, lubricants, fuel, power, water, materials, plant and instrument air, instruments and equipment required for the tests.

2. For final field tests of equipment and Systems, the Contractor shall furnish all labor, lubricants, materials, fuel, power, instruments and equipment required for the tests. DEP will furnish all water necessary.

3. All testing shall be performed by the Contractor and witnessed by the Engineer, DEP Operations personnel and, when applicable, representatives of the Electrical Division, Department of Buildings. Preliminary field testing of equipment and systems and final field testing of equipment and systems shall be performed within the time periods designated in the preliminary construction schedule (CPM) during regular weekday daytime working hours.

F. Coordination

1. Not Used

1.06 QUALITY ASSURANCE

A. Nothing stated herein shall affect the requirements contained in Section 01 43 05 – Contractor's Work Quality; or the specific pressure testing requirements for piping systems specified in the Contract Documents. Such tests shall be performed at the scheduled time, prior to backfilling, encasement or enclosure, if applicable. However, checking the systems for leakage at the pressures developed, particularly for leakage of the visible type, shall be performed as part of the tests included herein.

1.07 SUBMITTALS

A. The Contractor shall submit a preliminary and final field test schedule to the Engineer within 120 days after the date for commencing work in the Notice to Proceed. The test schedule shall be updated every 2 months or sooner if necessary, until completion of the required testing. The field test schedule shall itemize all key tasks in chronological order, based on the Construction CPM Schedule specified in Section 01 32 10 – Progress Scheduling, to meet all the requirements of this Section. All preliminary and final field testing to be conducted shall be organized and scheduled in accordance with the approved test procedure.

B. The field test schedule shall include proposed test dates, preliminary or final field test, equipment or System being tested, specification references, equipment

identification numbers, and indication of whether the test procedure has been submitted for approval and approval status.

C. The Contractor shall notify the Engineer in writing 30 days prior to any testing. The Contractor shall not proceed with any testing until the test procedure has been approved by the Engineer.

D. Before each test commences, the Contractor shall submit a detailed test procedure and manpower schedule to the Engineer for approval.

E. In addition, Other Contractors for equipment required to be field tested as part of a System shall furnish detailed test procedures for their equipment and assist in the testing of the system.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Preliminary Field Tests of Equipment

1. All equipment furnished under this Contract shall be tested in accordance with the Contract Documents

B. Preliminary Field Tests of System

1. The preliminary field testing shall be conducted under dry conditions (without

water loads) to the extent possible.

2. The operation of all related mechanical and electrical equipment shall be tested as a system and include the following major equipment:
    a. All control panel(s) and displays in accordance with Section 40 05 58 and corresponding 01 79 05 Equipment Start-up and Training.
    b. Steel Pipe and Fittings in accordance with Section 40 05 54
    c. Ultrasonic Pipe Flow Transmitter and ancillary devices in accordance with Section 40 61 94.225.
    d. Steel and Stainless-Steel Pipe in accordance with Section 40 05 22
    e. Bonneted Knife Gate Valves in accordance with Section 40 05 58
    f. Vibrating Wire Piezometers in accordance with Section 40 61 94.223
3. The bulkhead and screen on Drawing 475-M-203 shall be installed and removed to demonstrate general alignment, fit and mobility for maintenance and operation requirements.

C. Final Field Tests of Equipment and System

1. Final Field Tests of Equipment
    a. Equipment shall be tested in accordance with the contract documents
2. Final Field Tests of System
    b. The final field testing shall be conducted under wet conditions (full water load possible at the time of testing).
    c. The operation of all related mechanical and electrical equipment shall be tested as a system and include the following major equipment:
        i. All control panel(s) and displays in accordance with Section 40 05 58 and corresponding 01 79 05 Equipment Start-up and Training.
        ii. Steel Pipe and Fittings in accordance with Section 40 05 54
        iii. Ultrasonic Pipe Flow Transmitter and ancillary devices in accordance with Section 40 61 94.225.
        iv. Steel and Stainless-Steel Pipe in accordance with Section 40 05 22
        v. Bonneted Knife Gate Valves in accordance with Section 40 05 58
        vi. Vibrating Wire Piezometers in accordance with Section 40 61 94.223

d. The bulkhead and screen shall be operated (fitted and removed) to demonstrate performance (bulkhead leakage requirements/screen position) as stipulated by the contract documents and detailed on Drawing 475-M-203.

D. Systems:

1. In addition to the above, the following equipment groupings shall be tested together as Systems, in accordance with the Contract Documents:

a. HHLRT and UGC Lighting

b. HLRT Ventilation

c. High water level sensors in HLRT dry well

d. Fall Protection Systems

e. Lightning Protection System

f. Security cameras

g. Security alarms

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 78 10 – PROJECT CLOSEOUT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Items to be completed
2. Final record documents
3. Special tools and appliances
4. Spare parts and maintenance materials
5. Lubricants
6. Piping and equipment identification

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. As construction of the Project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to the Contract:

1. Scheduling equipment manufacturers' visits to the Site.
2. Required testing of project components.
3. Scheduling start-up and initial operation.
4. Scheduling and furnishing skilled personnel during initial operation.
5. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.
6. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.

B. The Contractor's attention is directed to the fact that required certificates and information listed herein must be submitted earlier in accordance with other Specifications.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. In addition to any requirements of the New York City Standard Construction Contract, before the determination of Substantial Completion is issued, the Contractor shall submit to the Engineer all required records, certifications, etc., which are specified in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit all items which are required by the Contract Documents:

1. Test results of project components.
2. Performance Affidavits for equipment.
3. Certification of equipment or materials in compliance with Contract Documents.
4. Operation and maintenance instructions or manuals for equipment.
5. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract.

6. Any special guarantees or bonds.

B. Final Record Documents

1. In addition to any requirements of the New York City Standard Construction Contract, in order to obtain Final Acceptance, the Contractor shall furnish Final Record Documents in accordance with Section 01 78 39 – Final Record Documents.

C. Lubricant Survey

1. A lubrication survey, made by a lubricant supply firm, subject to the approval of the Engineer shall be provided by the Contractor.

2. The lubrication survey shall list all equipment furnished, under this Contract, with the equipment manufacturer's lubrication recommendations and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible.

D. Spare Parts List

1. A complete list of spare parts and maintenance materials to be furnished shall be submitted to the Engineer for approval as part of the Shop Drawing submittals.

E. Special Tools List

1. The Contractor shall submit a complete list of special tools and appliances to be furnished, for approval by the Engineer, as a part of the Shop Drawing submittals.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Spare Parts

a. Upon acceptance of the spare parts by the Engineer, the Contractor shall deliver the spare parts for storage to the location within the City limits designated by DEP upon request by the Engineer.

2. Lubricants

a. The Contractor shall furnish lubricants for all equipment supplied under this Contract in one delivery consisting of a minimum number of products, reflecting the results of the lubrication survey, as specified herein.

B. Storage

1. Spare Parts

a. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number,

description and location within the equipment or system that the part is installed.

b. Complete information shall also be provided for use and reordering of spare parts.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare Parts

1. Spare parts and maintenance materials shall be furnished in accordance with all applicable Specifications.

2. Two complete spare sets of all lamps supplied as a part of electrical control equipment shall be furnished by the Contractor, unless otherwise called for in the Contract.

B. Special Tools

1. Special tools and appliances which are needed to adjust, operate, maintain or repair the equipment furnished under this Contract shall be provided in accordance with the Contract.

2. Special tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with heavy duty cylinder locks and duplicate keys.

1.10 WARRANTY

A. All spare parts shall be protected and packaged for a shelf life of at least ten (10) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Lubricants

1. The Contractor shall furnish and deliver such oil, grease and any special lubricants that are necessary for proper operation of all equipment furnished under this Contract. Identification and listing of such lubricants shall be made as part of the Shop Drawing submittals. The quantity furnished shall be sufficient for equipment start-up, operation prior to final acceptance of the Work, and for operation during the guaranty period as defined in Article 24 of the Standard Construction Contract. The grade of lubricants furnished shall be in accordance with the recommendations of the equipment manufacturers made on the approved equipment shop drawings.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Piping and Equipment Identification

1. The Contractor shall furnish and install identification signs for all equipment, control panels, valves and piping identification in accordance with specific requirements of the Contract for piping and equipment identification.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. In addition to any requirements of the New York City Standard Construction Contract, before the determination of Substantial Completion is issued, the Contractor shall clean and perform final adjustment of the various building components as specified in the Specifications, including but not limited to the following:

1. Clean all glass and adjust all windows and doors for proper operation.
2. Clean all finish hardware after adjustment for proper operation.
3. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.
4. Wax all resilient flooring materials, if required by the Engineer.
5. Remove bitumen from gravel stops, fascias and other exposed surfaces.
6. Remove all stains, marks, fingerprints, soil, spots and blemishes from all finished surfaces, tile, stone, brick and similar surfaces.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 78 24 – SPARE PARTS AND MAINTENANCE MATERIALS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall inventory, store, and deliver all spare parts and maintenance materials as shown, specified, and/or required.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

C. The following schedule, attached after the "End of Section" designation, is a part of this Section:

1. Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Furnish all spare parts and maintenance materials shown, specified, and/or required by the Contract Documents.

B. Contractor shall provide data for each distinct spare part or maintenance material, in paper and electronic format, as specified herein.

C. Contractor shall attach bar-code tag stickers, furnished by the Engineer, to each distinct spare part or maintenance material.

D. Schedule delivery of all spare parts and maintenance materials for the Work over a reasonable period of time and in coordination with DEP personnel and the Engineer.

E. All spare parts and maintenance materials shall be turned over to DEP in new condition and shall be furnished in manufacturers' unopened cartons, boxes, crates, or other protective covering, suitable for preventing corrosion or deterioration, for the maximum length of storage indicated by the part manufacturer.

F. The Contractor shall turn over spare parts and maintenance materials to DEP upon completion of the Work or when DEP assumes beneficial occupancy or as directed by DEP or Engineer. Contractor shall then place them in permanent storage rooms or areas designated by the DEP or Engineer.

G. Contractor shall be fully responsible for loss or damage to all spare parts and maintenance materials until such time they are handed over and accepted by DEP.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall include, but not be limited to:

1. Action Submittals:

a. List of all spare parts and maintenance materials and data:

1) The spare parts and maintenance materials list and data shall be submitted in paper and electronic format:

a) The electronic format shall be a spreadsheet that allows data to be uploaded into a commercial database system owned by DEP.

b) Refer to Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule, located after the "End of Section" designation, for the paper and electronic format.

2) The spare parts and maintenance materials list and data shall be submitted to the Engineer at least 120 Days prior to delivery.

2. Information Submittals:

a. Schedule of the intended dates for spare parts and maintenance materials deliveries.

b. Submit a letter of transmittal for each part or maintenance material shipment, including the following information, at a minimum:

1) Date of letter and transfer of parts and materials.

2) Contract title and number.

3) Contractor's name and address.

4) A complete inventory of the parts and materials, listing the applicable Specification Section and equipment item for each.

5) A place for DEP to sign and confirm receipt of the parts and materials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver spare parts and maintenance materials in accordance with the requirements of the Contract Documents. In addition:

1. Spare parts and maintenance material delivery shall require a minimum written notice to Engineer of 7 Days.

2. The Contractor shall attach bar-code stickers to each approved spare part or maintenance material, upon receipt.

a. The Engineer shall furnish bar code stickers and transmit the bar code stickers to the Contractor.

b. The sticker for any spare part shall be affixed to shipment packaging for that part.

c. If additional stickers are required for split deliveries or re-delivery of previously rejected parts, they will be furnished by the Engineer and transmitted to the Contractor.

B. The Contractor shall store and handle spare parts and maintenance materials in accordance with the requirements of the Contract Documents. In addition:

1. Store and handle spare parts and maintenance materials in accordance with manufacturer recommendations.

2. During construction and prior to acceptance by DEP, the Contractor shall store spare parts or maintenance materials in the Contractor's buildings or construction trailers. Storage locations shall have floor, roof, and closed sides, and be in accordance with the part manufacturers' recommendations.

a. Contractor shall protect spare parts and maintenance materials from weather, condensation, and humidity.

b. If the Contractor's assigned location is inappropriate, an alternate storage location shall be used, as designated by DEP, and at no additional cost to DEP.

c. Upon placement of each item in the storage location, the item bar-code sticker or tag shall be scanned into DEP Database along with the shelf bar-code sticker using hand held Radio Frequency Computers.

3. DEP personnel reserve the right to inspect each spare part or maintenance material upon delivery for adherence to approved submittals and reject any part or parts in accordance with said inspection.

a. Packaging shall be opened by the Contractor to allow such inspection.

b. DEP personnel reserve the right to reject any spare parts or maintenance materials during such inspection.

c. Any spare parts or maintenance materials rejected shall be taken back by Contractor and the Contractor shall resubmit a new spare part or maintenance material at no additional cost to DEP.

d. The Contractor shall provide DEP personnel with access, and transport if required, to the Contractor's storage facilities.

4. After acceptance of delivered spare parts and maintenance materials, the Contractor shall place accepted spare parts and maintenance materials in a storeroom directed by DEP personnel.

a. All spare parts and maintenance materials shall be identified, assigned a storeroom and location as directed by DEP personnel, delivered, shelved, and logged into the shelf or bin via scanning the barcode to the database referenced herein.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Data for each distinct spare part or maintenance material, per approved submittals, shall be recorded and entered into the existing computer database, provided by DEP and as directed by the Engineer.

1. Reference Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule, located after the End of Section designation.

2. Data shall include, but not necessarily be limited to:

a. Contract number.

b. Specification Section number.

c. Description of equipment for which part is being provided.

d. Equipment number (per DEP numbering system).

e. Manufacturer of part, manufacturer's part number.

f. Supplier / vendor for part, with name and contact information.

g. Unit price of part.

h. Quantity required to be delivered.

3. No spare parts or maintenance materials shall be accepted by DEP unless all data listed above has been entered into the database and barcodes have been applied as specified.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 01 78 24-1
SPARE PARTS AND MAINTENANCE MATERIALS SCHEDULE

CONTRACT _____EQUIPMENT DESCRIPTION AND NUMBER _____

EQUIPMENT SPEC. SECTION _____SUBMITTAL # _____REVIEW CYCLE # _____

PART DESCRIPTION	MANUFACTURER NAME	MANUFACTURER PART NO.	VENDOR NAME	VENDOR PART NO.	COMPONENT Y/N?	COMPONENT SERIAL #	QUANTITY ON ORDER (PER SPEC)

SECTION 01 78 25 – OPERATIONS AND MAINTENANCE MANUALS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. General requirements.
2. Operation and maintenance Manual requirements.
3. Binding and format requirements.
4. Submittals.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Implementation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. As a prerequisite to obtaining payments in excess of 50 percent of the equipment cost for equipment furnished under this Contract, the Contractor shall prepare, submit and obtain the Engineer's approval, as designated by "Approved," of an operation and maintenance Manual ("Manual") for each item of equipment supplied under the Contract. Approval is a prerequisite for continuing payments for equipment furnished by the Contractor, providing instructional services and equipment start-up.

B. Each Manual shall be prepared especially for each installation and shall include all pertinent and legible instructions, preventative maintenance instructions, technical bulletins and other printed matter required to provide accurate and comprehensive information for the safe and proper operation, maintenance and repair of the equipment.

C. Operation and Maintenance Manual Requirements:

1. The Manuals shall include, but not be limited to, the following:

a. Complete, detailed written operating instructions for each product or piece of equipment including: equipment function; operating characteristics; limiting conditions; operating instructions for startup, normal and emergency conditions; regulation and control; and shutdown.

b. Complete, detailed written preventive maintenance instructions, including all information and instructions required to keep a product or piece of equipment properly lubricated, adjusted and maintained so that the item functions economically throughout its full design life. Preventive maintenance instructions include, but are not limited to, the following:

1) A written explanation with illustrations for each preventive maintenance task.

2) Recommended schedule for execution of preventive maintenance tasks.

3) Lubrication charts.

4) Table of alternative lubricants.

5) Troubleshooting instructions.

6) List of required maintenance tools and equipment.

7) Nameplate data of each component, year of installation, Contract number and Specification number.

c. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s).

d. Installation instructions.

e. Emergency operating instructions and capabilities.

f. Troubleshooting and corrective maintenance (repair) procedures.

g. Drawings suitable for assembly and disassembly of entire system or unit, and each component, and approved wiring and control diagrams, all as required for operation, maintenance and repair of the equipment supplied. Drawings shall be black on white, clearly legible and no larger than 11" x 17".

h. Parts list with current prices and ordering information.

i. List of recommended spare parts and the recommended number of each.

j. Name, address and telephone number of nearest parts supply house and nearest repair service center.

k. Warranties, guarantees, bonds and service contracts.

l. Long-term and short-term manufacturer's recommended equipment storage procedures.

m. Written explanations of all safety considerations relating to operation and maintenance procedures.

n. Name, address and telephone number of manufacturer, manufacturer's local service representative, and subcontractor or installer.

o. Copy of all approved shop drawings.

p. Catalogs, diagrams, schematics, drawings, instruction bulletins and manuals marked by underlining, checking, the use of arrows or the obliteration or removal of extraneous data, so as to pertain only to the specific equipment item for which the manual is supplied.

q. Complete electrical schematics and wiring diagrams. Complete wiring between terminal points must be shown. Computerized diagrams are not acceptable.

2. Reference to features and elements of equipment, such as operational limits of time, speed, pressure, temperature, etc. shall be clear, complete and compatible with authoritative published engineering reference documents. All functional components, electrical systems, equipment, etc. shall be shown on diagrams and discussed in the text so as to identify their proper system relationship. Operation, service, trouble-shooting, checkout and in-line and bench repair procedures, identifying specific system characteristics of the equipment shall be provided. The information shall

include recommended procedures and frequencies for preventive maintenance such as inspection, adjustment, lubrication, calibration and cleaning.

3. Equipment parts shall be identified by manufacturer's part number and located with relation to other components of the equipment utilizing "exploded" type drawings for clarity, if required. Complete parts lists shall be included, which indicate the part number, the part description, applicable serial and model numbers, current unit prices and the name, address and telephone number of the nearest equipment manufacturer's representative and nearest service and spare parts warehouse. Complete instructions for the ordering of all replaceable parts shall be noted in this section of a Manual. Recommendations as to spare parts and spare inventory levels shall be made. Where pertinent, lead time and shelf life values and preservation, packaging and labeling methods shall be also recommended.

4. All copyrighted material used in the Manual or in any operation required in the performance of the Contract will be preceded by the Contractor obtaining the copyright holder's written permission on behalf of DEP to use such material in perpetuity.

D. Binding and Format Requirements:

1. Each Manual shall be bound in a durable, permanent, hard cover binder of one (more if required) volume with a complete index of the Manual's contents arranged by subject matter and in order of presentation in each volume. Applicable equipment item numbers, as shown in the Contract Documents shall be prominently included at their appropriate location in the index. The title of the Manual shall be securely affixed to the binder in two places: the front cover and the binder back edge. The title shall identify the Project by number and name, location of the site, state the volume is an O&M Manual, generally classify the equipment and state the manufacturer's name and equipment model number.

2. Intermediate submittals of the Manual for approval by the Engineer need not be hard bound.

3. Use 8½-inch by 11-inch paper of high rag content and quality. Larger drawings or illustrations (no larger than 11" x 17") are acceptable if neatly folded to the specified size in a manner which will permit easy unfolding without removal from the binder. Provide reinforced punched binder tab. Or provide fly-leaf for each product.

4. All text must be legible typewritten or machine printed originals or high quality copies of same.

5. Each page shall have a binding margin of approximately 1½ inches and be punched for placement in a three-ring loose-leaf or triple post binder. Provide binders. Identify each binder with the following:

a. Title "OPERATING AND MAINTENANCE MANUAL"

b. Project title and number.

c. Contract title and number.

d. Identity of building or structure as applicable.

e. Identity of general subject matter covered.

6. Use dividers and indexed tabs between major categories of information such as operating instructions, preventive maintenance instructions, or other. When necessary, place each major category in a separate binder.

7. Provide a Table of Contents for each binder. Identify products by their functional names in the Table of Contents and at least once in each chapter or section. Thereafter, abbreviations and acronyms may be used if their meaning is explained in a table in the back of each binder. Use of model or catalog numbers or letters for identification is not acceptable.

E. Submittals:

1. The Contractor's submittal to the Engineer for approval shall consist of three (3) complete sets of each Manual and three (3) copies of an itemized listing providing cross-references between the Specification, the approved Shop Drawings, and the Manual submittal.

2. A transmittal will be returned to the Contractor indicating the status of the Manual and will include a tabulation of any pages being returned with review comments and noting any extra pages required clarifying or amplifying the comments. Copies of only the pages containing comments and any additional pages needed to clarify or amplify the comments will be attached to the transmittal. The status of the Manual will be noted on the front page of the Manual, which will also be attached to the transmittal, and will be stamped either, "Furnished as Submitted" or "Furnish as Corrected", when the Manual submittal substantially conforms to the requirements of this Section and requires minor corrections; or "Revise and Resubmit" when the Manual submittal is considered inadequate, inaccurate or lacking essential information.

3. The Contractor shall rectify all submittals annotated "Furnish as Corrected," or "Revise and Resubmit" within 15 days of receipt of such notice by replacing pages or adding additional data, as required. The Manual's Index of Contents and the itemized, cross-referenced listing shall be revised to reflect all revisions or additions made. Then, three (3) copies of the revised material shall be resubmitted to the Engineer for approval.

4. When the status of the Manual is stamped "Rejected," a transmittal to the Contractor will return the copies of the Manual intact with the reason for the rejection stated. The Manual will be stamped "Rejected" when the submittal is considered illegible, or does not contain a complete index of contents and/or an itemized list of cross references, or is so incomplete and lacking in required documentation as to preclude a meaningful review by

the Engineer. Within 15 days of receipt of such notice the Contractor shall revise the Manual and resubmit to the Engineer for approval.

5. Final Approved Copies of the Manuals:

a. After a Manual submittal receives final approval status, signified by the annotation "Furnish as Submitted", the Contractor shall furnish the final Manual to the Engineer in the quantities and formats specified in Section 01 78 39 – Final Record Documents.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for all Final Record Documents.

B. The following index of this Section is presented for convenience:

C.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	9
3.04	Startup / Demonstration	9
3.05	Adjusting / Protection / Cleanup	9

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 29 10 – Schedule of Values

B. Section 01 32 30 – Job Photographs and Videos

C. Section 01 33 00 – Submittal Procedures

D. Section 01 43 10 – Relocation of Utilities

E. Section 01 71 30 – Protection and Restoration of Structures

F. Section 01 78 40 – Records in Paper Formats

G. Section 01 78 42 – Records in Electronic Formats

H. Section 01 78 25 – Operation and Maintenance Manuals

1.04 REFERENCES

A. Archive: For the purposes of this Section, to Archive means to furnish as a final record document.

B. As-Built Drawings. The "As-Built Drawings" reflect the "as constructed" final product. These drawings shall use the same title blocks and sheet numbers as the original "Bid Set Drawings", with the exception that an "AB" is prefixed onto the original drawing number.

C. Final Copy Shop Drawing (FCSD): Final Copy Shop Drawing means the approved copy (Furnish as Submitted (FAS), Furnish as Noted (FAN), or Furnish as Corrected (FAC)) of the Shop Drawing as described in Section 01 33 00 - Submittal Procedures, corrected to reflect any deviations made for the installed condition showing the actual construction.

D. Conformed Drawings: The Conformed Drawings are the original Bid Set Contract Drawings modified to incorporate the changes made by addenda to the Invitation for Bids issued during the bid period.

E. Conformed Set Contract: The Conformed Set Contract is the original Bid Set Contract modified to incorporate the changes made by addenda to the Invitation for Bids issued during the bid period.

F. Bid Set Drawings (or Design Drawings): The Bid Set Drawings consist of the original Contract Drawings issued by DEP with the Invitation for Bids.

G. Bid Set Contract (including Addenda): The Bid Set Contract is the text of the original Contract (excluding Contract Drawings) issued by DEP with the Invitation for Bids, including any Addenda issued during the bid period.

H. Change Orders: The Change Orders include registered Change Order forms and the complete sets of attached text and/or drawings for all design and field Change Orders.

I. Operations and Maintenance Manuals: When specified, Operations and Maintenance Manuals ("O&M Manuals") shall be prepared by the Contractor in conformance with Section 01 78 25 - Operation and Maintenance Manuals. Final copies of the O&M Manuals shall be submitted in accordance with the requirements of this Section.

J. EPMIS: DEP's web-based Enterprise Project Management Information System ("EPMIS" or "the System") used to manage all Project communications, workflows and document submittals.

K. Key Documents: For purposes of this Section, Key Documents shall include, but not be limited to, the following items:

1. Signed copy of the Contract;
2. The Contractor's bonds;
3. Signed and submitted Bid Schedule of Prices;
4. DEP Award Folder contents;
5. Contract Notice of Award letter;
6. Notice to Proceed letter;
7. Approved Schedule of Values as described in Section 01 29 10 – Schedule of Values;
8. Written determination by the Engineer or Resident Engineer, as applicable, that the Work is substantially complete, as described in Article 14 of the Standard Construction Contract;
9. Final Approved Punch List
10. Final evaluation;
11. Final extension of time (if applicable);
12. Claim settlements (if applicable);
13. Certificate of Occupancy;
14. Warranties;
15. Structure Survey (per Article 9 of the General Conditions);
16. Regulatory Transition Plan (where applicable).

L. Job Photographs and Videos: The photographs and videos furnished in accordance with Section 01 32 30 – Job Photographs and Videos.

M. Additional Documents: Any additional documents that the Engineer directs to be furnished as a final record document in accordance with the requirements of this Section.

1.05 DESCRIPTION

A. Not Used.

1.06 QUALITY ASSURANCE

A. Project records in electronic and paper formats shall be submitted in conformance with the following specifications, as applicable:

1. All records in electronic format shall be produced in conformity with Section 01 78 42 – Records in Electronic Formats.
2. All records in paper formats shall be produced in conformity with Section 01 78 40 – Records in Paper Formats.

1.07 SUBMITTALS

A. Format

1. The Contractor shall submit the final record documents in electronic and paper formats, according to the requirements of Table 1 – Summary of Final Record Documents to be Furnished, attached at the end of this Section.

B. Quantities

1. The quantities and formats to be furnished for each Final Record Document shall be as shown in Table 1.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Final Record Documents shall be delivered to the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. As-Built Drawings

1. The Contractor shall create an As-Built Drawing Set by revising the Conformed Drawings in .DWG or .RVT or in some cases a combination of both formats conforming to ISO 13567 and the NYCDEP BIM/CAD Standard Manual. If no Conformed Drawings were created, then the Contractor shall use the original Bid Set Drawings. When using the

Conformed Drawings, the Contractor shall independently confirm that the changes made by the Addenda to the original Bid Set Drawings were correctly reflected in the Conformed Drawings. Files submitted in .DWG or .RVT format will be bound to include all related matter (e.g., base files, font files and shapes). If submitting in .RVT format, the file must contain the 3D discipline models, discipline links, and all associated drawing sheets. Each file shall be viewable and printable in its entirety without recourse to external files. In addition to .DWG or .RVT or a combination of both formats of deliverables, the Contractor shall also submit a point cloud deliverable, supplied in industry-standard formats such as .RCP/.RCS, and shall accurately capture the completed conditions of the project and be aligned to the established project coordinate system.

2. The Contractor shall use the information compiled during construction to create an As-Built Drawing Set. The Contractor shall document any deviations and/or changes from the configurations shown on the original Contract Drawings or revised drawings issued during the course of executing the Work including Change Orders, Design During Construction (DSDC) memoranda and Requests for Information (RFIs). These deviations and/or changes shall generally relate to topographic features, relocation of structures, or locations of underground items such as pipelines, duct banks, manholes or footings. The information contained in the Protection and Restoration Drawings, as described in Section 01 71 30 – Protection and Restoration of Structures, shall be incorporated by the Contractor into the As-Built Drawings. Survey distances, coordinates and/or elevations shall be included to accurately locate all such items. All deviations and/or changes shown shall be field verified.

3. The Contractor should have the electronic files of the Contract Drawings. However, should the Contractor require an additional copy, the Engineer will supply the Contract Drawings in AutoCAD files upon written request, if such copies are available. The AutoCAD files will consist of a bound set of drawings.

4. Drawing Size – The As-Built Drawings are to be the same size as the full size Contract Drawings (22-inches by 34-inches).

5. The new As-Built Drawing number shall be generated as per the following steps:

   a. The As-Built Drawing number is the original Bid Set Drawing number prefixed by an “AB” for As-Built.

      1) Example: If the drawing number for a Contract Drawing is 36G-02S-14, the As-Built Drawing number will be “AB-36G-02S-14”.

   b. If a new drawing is produced, its number can be added to the end of the series (i.e., if 14 is the last drawing in the series, then the first new drawing becomes 15; the second new one becomes 16, etc.).

c. If a new drawing is inserted into the middle of a series, it is assigned a letter suffix starting with A (i.e., 02A, 02B, etc.).

1) Example: If the drawing number for a Contract Drawing is 36G-02S-02, the new, additional As-Built drawing will be numbered "AB-36G-02S-02A".

6. Designation – The designation "As-Built Drawing" is to be added to the drawing. Insert the words "As-Built Drawing" above the title box in the right hand corner of the drawing. (Do not include the quotation marks in "As-Built Drawing" when marking the drawing.)

7. Modifying the Contract Drawings – Prior to submitting an As-Built Drawing made from a Contract Drawing for review and acceptance, the Contractor is to create a "clean" finished copy of the drawing by undertaking the following:

a. Remove all signatures and certifications from the Contract Drawing

b. Remove all previous revisions and references from the revision boxes

c. Remove the Professional Engineers seal, Engineer's company names, and any initials from the drawing title block

d. Modify all of the original title boxes to show the Contractor information including the name of the Contractor and the date.

e. Remove all previous markings (notes, revision indicators, balloons, submittal stamps, etc.) from the drawing.

8. Contractor's Information – The Contractor's name, address, contact information and date (month and year) the Project is completed is to be added to the drawing. Place this information in the title block in the space previously utilized for the Engineer's name.

9. Adding Revisions – Items/areas changed are to be enclosed within a cloud line. The revision cloud layer is to be a 0.024-inch line thickness.

10. The Contractor shall submit copies of the As-Built Drawings for review and approval by the Engineer. These submittals shall show the deviations and changes from the original design drawings by using red-line mark-ups. The Contractor shall make modifications to the submitted As-Built Drawings as required by the Engineer. In the final, approved set of As-Built Drawings, the red lines shall be converted to black.

11. The final approved set of As-Built Drawings shall have the following statement on the cover sheet:

"These As-Built Drawings for Contract ###, as prepared by XYZ Company, have been prepared as Record Copy Drawings."

The above statement shall be signed by the representative of the Contractor. The signer shall be identified along with the Contractor.

B. Final Copy Shop Drawings (FCSDs)

1. The Contractor shall furnish all FCSDs to DEP.

   a. The FCSD shall be the approved copy (FAS or FAC) of the Shop Drawing, corrected to reflect any deviations made for the installed condition showing the actual construction.

2. In addition to submitting the complete set of FCSDs as a final item at the end of construction, the Contractor shall prepare and submit FCSDs for approval on a continual basis during the performance of the Work when the particular item of Work for a FCSD has been completed. The Contractor shall submit the FCSD within 30 days after the completion of the Work item.

3. The drawing revision boxes shall have all previous revisions and references removed from the drawings. The revision boxes shall indicate "Final Copy Shop Drawing."

4. Each drawing shall bear the original submittal file number, without the revision number, which shall be written in the lower right hand corner of a drawing above the title box. The file number shall also have a prefix, which identifies it as a FCSD.

   a. For example, if the file number for an approved Shop Drawing is 26 05 91-002, the FCSD will be numbered "FCSD-26 05 91-002",

5. Supporting Documentation: Supporting documentation shall bear the correlating FCSD file number so as to identify it. All supporting documentation (e.g., catalog cuts, test results, calculations, etc.) shall be submitted, together with the related FCSD so as to maintain a complete set of all documents submitted with each FCSD.

6. FCSD Submittal for Approval

   a. Two (2) paper prints of each FCSD full size where applicable shall be submitted for approval. The drawing shall be checked by the Resident Engineer against the field records and a copy shall either be stamped "Approved" or returned with comments for correction and re-submittal by the Contractor. The Contractor shall retain one (1) approved set of the FCSDs for use in submitting the entire set in paper and electronic copies.

C. Bid Set Contract

1. If the Contractor does not have a complete set of the original Bid Set Contract (including Addenda) in the original PDF format (non-scanned), it may request a set from the Engineer. Upon request, the Bid Set Contract and Addenda will be provided to the Contractor in PDF format if possible. If a PDF format is not available, then a paper copy set may be utilized. This

may also be requested from the Engineer if required and shall be provided if possible.

2. The Contractor shall Archive the entire set of Contract Documents, except Contract Drawings, as discussed below. This set shall include all the sequential pages of the Contract Documents and shall include:

   a. Front and back covers

   b. Invitation for Bids

   c. Information for Bidders

   d. Table of Contents

   e. Notice to Bidders

   f. Standard Construction Contract

   g. General Conditions

   h. Schedule of Wage Rates

   i. Specification Sections

   j. Addenda

3. On a multiple contract project, the "E," "P," and "H" Contractors shall only Archive the Detailed Specifications respective to their Work. These are only required in electronic Archives. No paper version is required as that will be produced by the “G” Contractor.

4. The signed (executed) parts of the Standard Construction Contract shall be included by the Contractor as part of the Key Documents.

D. Bid Set Drawings (Design Drawings).

1. The Bid Set Drawings shall be Archived. If the Contractor does not have a complete set of the original Bid Set Drawings in .DWG or .RVT format, the Contractor may request a set from the Engineer. If possible, the Bid Set Drawings will be provided to the Contractor in .DWG or .RVT format, bound with their respective data sets.

E. Conformed Set Contract

1. The Conformed Set Contract shall be Archived.

F. Conformed Drawings

1. The Conformed Drawings shall be Archived. If the Contractor does not have a complete set of the Conformed Drawings in the .DWG or .RVT format, it may request a set from the Engineer. If possible, the Conformed Drawings will be provided to the Contractor in .DWG or .RVT format, bound with their respective data sets.

G. Change Orders

1. All Change Orders (both field and design) produced during the construction of the Project shall be Archived.

H. Operations and Maintenance (O&M) Manuals

1. The O&M Manuals shall be Archived.

2. O&M Manuals should have been submitted and reviewed as part of the shop drawings submission and review process in accordance with Section 01 78 25 - Operations and Maintenance Manuals.

3. Final, approved copies of the O&M Manuals shall be furnished during the progress of the work in accordance with Section 01 78 25 - Operations and Maintenance Manuals. Additional electronic copies of each manual shall be submitted as part of the Final Record Documents.

I. Key Documents

1. Key Documents produced during the construction of the Project shall be Archived. They shall consist generally of the items defined above.

J. Additional Documents

1. Any Additional Documents such as Soil Classification Reports, Environmental Impact Statements, Site Assessments, Geotechnical Reports, permits and RFIs shall also be Archived when directed by DEP. If the Contractor does not have copies of any documents, they will be provided by the Engineer, when possible, in electronic or paper format.

K. Job Photographs and Videos

1. Job Photographs and Videos produced during the performance of the Work shall be Archived.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Table 1
Summary of Final Record Documents to be Furnished

Final Record Document Type	EPMIS	Electron (USB Drive)
As-Built Drawings	1 set (PDF/A & AutoCAD)	4 (PDF/A AutoCA
Final Copy Shop Drawings	1 set (PDF/A & AutoCAD)	4 (PDF/A AutoCA
Conformed Drawings	1 set (PDF/A & AutoCAD	4 (PDF/A AutoCA
Bid Set Drawings	1 set (PDF/A & AutoCAD)	4 (PDF/A AutoCA
Bid Set Contract (including Addenda)	1 set (PDF/A)	4 (PDF/A
Conformed Contract	1 set (PDF/A)	4 (PDF/A
Change Orders (Text & Drawings) (Design & Field)	1 set (PDF/A)	4 (PDF/A
O&M Manuals	1 set (PDF/A)	6 (PDF/A 2 compila sets*
Key Documents	1 set (PDF/A)	4 (PDF/A
Additional Documents	1 set (PDF/A)	4 (PDF/A
Job Photographs	1 set (TIFF)	2 (TIFF)
Job Videos	1 Set (MPEG 2)	2 (MPEG

* Each paper copy of an O&M manual shall have an eletronic copy of the Manual in a fitted sleeve attached on the inside of the front cover of the binder for the Manual. These shall be furnished to the Operating Bureau in accordance with the requirements Section 01 78 25 - Operation and Maintenance during the progress of the work. Two extra eletronic sets of each manual or two compilation sets be furnished as part of the Final Record Documents.

SECTION 01 78 40 – RECORDS IN PAPER FORMATS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for all Final Record Documents to be produced in paper formats.

B. Expected longevity of paper documents without significant deterioration under normal use and storage conditions.

C. Properties of the paper and of the printing processes, and the tests required to demonstrate these properties.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Application	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 25 - Operation and Maintenance Manuals

B. Section 01 78 39 - Final Record Documents

1.04 REFERENCES

A. Definitions:

1. Small-Format Documents: 11 inches by 17 inches or smaller
2. Large-Format Documents: larger than 11 inches by 17 inches

B. Reference Standards:

1. ANSI/NISO Z39.48 - Permanence of Paper for Publications and Documents in Libraries and Archives

1.05 DESCRIPTION

A. Final Record Documents

For the Final Record Documents specified in Section 01 78 39 - Final Record Documents, the following directions shall apply.

1. Drawings
   a. As specified in Section 01 78 39 - Final Record Documents, provide full size, paper copies of the Final Copy Shop Drawings and As-Built Drawings (if required).
      1) Bid Set and Conformed Drawings are not required to be furnished as paper copies but shall be furnished as part of the electronic archives.
   b. Paper copies are to be produced from the electronic copies.
2. Bid Set - Contract
   a. A single set of the Bid Set Contract in paper format shall be provided by the Contractor, and it shall be identical to the copy distributed for bid. They shall be furnished as bound volumes.
   b. All Addenda shall be produced in paper format by the Contractor. Each Addendum shall be bound separately and include all attachments including sketches and drawings. Drawings shall be attached using half-size drawings (11 inches x 17 inches).
3. O&M Manuals
   a. As required in Section 01 78 25 - Operation and Maintenance Manuals, submit hard bound copies and electronic copies of each O&M Manual during the progress of the Work.
   b. No additional paper copies are required to be submitted as part of the Final Record Documents.
4. Key Documents

a. Key Documents, as defined in Section 01 78 39 - Final Record Documents, are not required to be produced in paper format.

5. Change Orders

a. Change orders are not required to be produced in paper format.

6. Job Photographs

a. The job photographs are not required to be produced in paper format for purposes of the Final Record Documents.

7. Additional Documents

a. Additional Documents are not required to be produced in paper format.

1.06 QUALITY ASSURANCE

A. Testing

1. Test Method: All printing processes and materials used to produce the documents covered by this Section shall be tested periodically to ensure proper function, using the National Archives and Records Administration Technical Information Peel Test.

2. Test Frequency: All printing processes and materials used to produce the documents covered by this Section shall be tested not less than twice a day, once at the beginning of the work day, and once at the end of the work day.

B. Inspections

1. DEP may carry out inspections of the production facilities without notice.

1.07 SUBMITTALS

A. Paper Certification: All documents covered by this Section shall be accompanied by a certification from the manufacturer of the paper that it complies with ANSI/NISO Z39.48.

B. Printing Test Certification: The organization that operates the printing processes and materials used to produce the documents covered by this Section shall submit the following documentation as proof that the tests have been carried out:

1. An affidavit, signed by the supervisor responsible for the production area, certifying that the tests have been performed in accordance with the procedures described in the National Archives and Records Administration Peel Test.

2. All of the Peel Test targets actually used to perform the tests.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Properties of Paper

1. All paper used for documents covered by this Section shall conform to the standards of ANSI/NISO Z39.48, as amended herein, for pH, tear resistance, alkaline reserves and paper stock.

2. Paper Stock

a. Uncoated paper shall be used.

b. Uncoated paper shall not be less than 24 pounds basis weight.

B. Printing Processes

1. Small Format Documents, With Color Images and with Black and White Images

a. Only electro-photographic printing shall be used. When color electro-photographic printing is used, the process shall be certified by the manufacturer of the printer as not soluble in water, chemically stable, and resistant to fading, for a period of not less than 50 years. All documents printed using a color electro-photographic printer shall be accompanied by a certification from the manufacturer of the printer that the process is in compliance with this requirement.

2. Large-Format Documents, With Black and White Images

a. Only electro-photographic printing shall be used. Large-Format Documents shall be printed in black and white, unless color is an essential information component of the document. An example of documents where color may be an essential information component is a topographic drawing produced from data in a Geographic Information System. Color prints, when required, shall comply with the provisions specified below.

3. Large-Format Documents, With Color Images and with Black and White Images

a. Either electro-photographic or inkjet printing shall be used. When inkjet printing is used, a formulation of ink shall be used that is certified by the manufacturer of the printer as not soluble in water, chemically stable, and resistant to fading, for a period of not less

than 50 years. All documents printed using an inkjet printer shall be accompanied by a certification from the manufacturer of the inks that the inks are in compliance with this requirement.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 78 42 – RECORDS IN ELECTRONIC FORMATS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Specification describes the requirements for the electronic records for the items specified in Section 01 78 39 - Final Record Documents

B. This Specification does not cover digital objects which include a time base correction code (e.g., analogue or digital video recordings, analog or digital audio recordings, instrumentation data feeds, etc.), or geo-coded objects (produced by Geographic Information Systems (GIS)).

C. This Specification does not cover digital records stored in EPMIS.

D. Exhibit A – Folder Structure

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 30 - Job Photographs and Videos

B. Section 01 78 39 - Final Record Documents

C. Section 01 78 40 - Records in Paper Formats

1.04 REFERENCES

A. ANSI/AIIM MS44 – Recommended Practice for Quality Control of Image Scanning

B. ANSI/AIIM MS52 – Recommended Practice for the Requirements and Characteristics of Original Documents Intended for Optical Scanning

C. ANSI/AIIM TR34 – Sampling Procedures for Inspection by Attributes of Images in Electronic Image Management and Micrographic Systems

D. ISO 19005-1 - Document Management -- Electronic document file format for long-term preservation - Part 1: Use of PDF 1.4 (PDF/A-1).

1.05 DESCRIPTION

A. Archive: For the purposes of this Section, to Archive shall mean to furnish as a Final Record Document.

B. Metadata: Metadata is commonly defined as “data about data.” For the purposes of this Section, Metadata refers to the “descriptive metadata” that describes the content and form of the construction records known as Final Record Documents (i.e. contract name, document date, construction phase, engineer of record, etc.) and supports the discovery (searching) and identification of the resources.

C. Portable Document Format-Archival (PDF/A): A standard that identifies a "profile" for electronic documents that ensures the documents can be reproduced the exact same way. A key element to this reproducibility is the requirement for PDF/A documents to be 100% self-contained. All of the information necessary for displaying the document in the same manner every time is embedded in the file. This includes, but is not limited to, all content (text, raster images and vector graphics), fonts, and color information. A PDF/A document is not permitted to be reliant on information from external sources (e.g. font programs and hyperlinks).

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. File Transfer Media

1. The current file transfer medium is a waterproof USB solid state drive (SSD) also known as a flash drive. Alternative file transfer media may be used, at the discretion of DEP.

2. The USB SSD used for producing the electronic Archives shall be:

a. Corsair Flash Survivor USB 3.0 with 256 gigabytes storage

b. Or approved equal.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Source of Electronic Records

1. In preparing the electronic records, the Contractor shall make every reasonable effort to obtain from the originator (e.g., the manufacturer) documents in their original electronic format and incorporate these in the Final Record Documents. Subject to the approval of the Engineer, electronic records may be scanned from a paper version only when the Contractor cannot obtain the electronic version from the originator.

B. Metadata

1. For each type of Final Record Document, a Metadata table shall be prepared in Microsoft Excel which will furnish the specified data for that document. The data elements shall be furnished to the Contractor by DEP prior to production of the Final Record Documents USB SSD.

2. The Metadata Excel tables shall be utilized as the Final Record Document Log. Templates for the Metadata Excel table for each Final Record Document will be provided by the DEP.

3. The Metadata Excel Table shall be included in the USB SSD of each Final Record Document type and shall serve as an index for the files of the record in the USB SSD. Each file indexed in the Metadata Table shall be hyperlinked so that clicking on the file name opens that file. The filenames given on the Metadata Table must exactly match the files on the USB SSD to which they are hyperlinked.

4. A sample Metadata Excel table will be provided by DEP.

C. File Compression, File Formats, and Quality Control

1. File compression is not permitted for any of the files in any format.

2. File formats acceptable to DEP are ISO 19005-1 Portable Document Format-Archival (PDF/A); Tagged Image File Format (TIFF), version 6.0 ("II" format); AutoCAD and Revit. All files shall be delivered to DEP with file names that use the default file extension for each of the above formats.

3. Portable Document Format-Archival (PDF/A)

a. Security Settings: Records converted to PDF/A must have all security settings deactivated (e.g., encryption, master passwords, and/or permissions) prior to transfer to DEP. Deactivating security settings ensures DEP's ability to support long term migration and preservation of the records.

b. Review of Special Features: Because of the complexities associated with certain PDF features, DEP will review PDF/A records containing special features on a case-by-case basis when the records are scheduled. Examples of special features include but are not limited to: digital signatures; links to other documents, files or sites; embedded files (including multimedia objects); form data; comments and/or annotations.

c. Fonts: Electronic records that have been converted to PDF/A from their native electronic formats must have all fonts referenced in the record embedded within the PDF file to guarantee the visual reproduction of all text as created. This requirement is met by having, as a minimum, subsets of all referenced fonts embedded within the PDF/A file. All fonts embedded in PDF/A records must be publicly identified as legally embeddable (i.e., font license permits embedding) in a file for unlimited, universal viewing and printing;

d. Scanning Production Requirements: Records converted from scanned images also must adhere to the production requirements described in Paragraph 6 below.

4. Tagged Image File Format (TIFF)

a. In the "II" format (i.e., little-endian), byte order is always from the least significant byte to the most significant byte.

5. Vector Drawings

   a. Each vector drawing produced by Computer-Assisted Design (CAD) system shall be delivered to DEP in two different file formats: Native AutoCAD or Revit; and PDF/A.

   b. Drawings will be "bound" to include all related matter, such as base files, font files, and shapes. Each file shall be viewable and printable, in its entirety, without recourse to external matter.

6. Text Files

   a. The file format for all text files, whether converted from office automation systems or scanned, is PDF/A.

   b. The quality of documents to be scanned shall be governed by ANSI/AIIM MS52 "Recommended Practice for the Requirements and Characteristics of Original Documents Intended for Optical Scanning".

   c. Quality Control in the scanning process shall follow the practices established in ANSI/AIIM MS44 "Recommended Practice for Quality Control of Image Scanning" and ANSI/AIIM TR34 "Sampling Procedures for Inspection by Attributes of Images in Electronic Image Management and Micrographic Systems". The sampling rates for each type of Quality Control (visual and printed) shall be established by written agreement with DEP. The Subcontractor producing Final Record Documents shall supply a description of the Quality Control inspection performed as part of the scanning process and a report on the results of the last inspection performed on the images and the date of that inspection.

   d. Documents shall be scanned using equipment and scanning parameters sufficient to ensure full reproduction of all significant detail in the documents, such as (but not limited to) curved lines and fill in drawings, color and tonal gradations in photographic images, the smallest printed text, handwritten notes, and signatures. Records may be scanned in bitonal (1-bit) mode and 300 pixels per inch (ppi) or better only when the records consist exclusively of clean printed type possessing high inherent contrast (e.g., laser printed or typeset on a white background). Records shall be scanned in gray scale (8-bit) and 300 ppi or better when the records consist of textual documents of poor legibility because of low inherent contrast, staining or fading (e.g., carbon copies, thermofax, or documents with handwritten annotations or other markings), or that contain halftone illustrations or photographs. Records shall be scanned in color (24-bit RGB) and 300 ppi or better when the records contain color information important to interpretation or content.

7. Digital Photographs

a. The file format for digital photographs is TIFF.

b. Photographic (raster) images shall be produced directly by digital cameras.

c. Digital cameras shall produce records with true optical resolution. Images shall not be resized or interpolated to a higher resolution from a lower resolution.

d. Photographic images shall be provided as continuous-tone (8-bit) gray scale or color (24-bit or 48-bit RGB) raster images.

e. Digital camera files shall be captured as specified in Section 01 32 30 - Job Photographs and Videos.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT A

USB SSD Folder Structure

The USB SSD shall have a folder structure similar to the ones shown below.

For a USB SSD with one set of Final Record Documents

"Contract # – Bid Drawings (PDF Files)
Metadata Table- Contract # – As-Built Drawings - PDF.xls"

For a USB SSD with more than one set of Final Record Documents:

"Contract # – Bid Drawings (PDF)
Contract # – Bid Drawings (PDF Files)
Metadata Table- Contract ### – As-Built Drawings - PDF.xls"
"Contract # – Bid Drawings (AutoCAD or Revit)
Contract # – Bid Drawings (AutoCAD or Revit Files)
Metadata Table- Contract # – As-Built Drawings - AutoCAD.xls or Revit.xls"

NO TEXT ON THIS PAGE

SECTION 01 79 05 – EQUIPMENT START-UP AND TRAINING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Representatives of Equipment Manufacturers
2. Start-up Services
3. Training of plant personnel
4. Lesson plans
5. Training aids
6. Qualifications of training specialists

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	6
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Application	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 75 10 – Preliminary and Final Field Tests

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Representatives of Equipment Manufacturers:

1. The Contractor shall provide the services of qualified factory trained representatives of the equipment manufacturers, who shall provide the following services:

a. Supervise and assist in the installation of the equipment to ensure a proper installation of the equipment.

b. Check the installation of the equipment and make all necessary adjustments prior to placing the equipment in service.

c. Supervise the preliminary and final equipment and system field test work specified in Section 01 75 10 - Preliminary and Final Field Tests.

1) Additional acceptance testing supervision resulting from the failure to meet the specified performance requirements shall be at the Contractor's expense.

d. Conduct training of DEP personnel as specified herein. One day of training by a manufacturer's representative shall be defined as a minimum of eight (8) hours on-Site.

2. The manufacturers' representatives shall devote, at a minimum, the amount of full time specified under the Contract Documents.

3. The Contractor shall coordinate all equipment start-up services and training with the City, the Engineer and the manufacturers.

B. Start-Up Services:

1. The equipment start-up and initial operating period shall begin after satisfactory completion and acceptance of the preliminary and final equipment field tests and preliminary system field tests. The start-up and initial operating period shall demonstrate that the equipment functions as specified and shown under actual operating conditions by operating continuously for at least twenty-eight (28) days with no more than twenty-four (24) hours of total down time and no more than four (4) unscheduled shutdowns. Equipment start up and initial operating period shall be complete after a minimum of twenty-eight (28) days of continuous operation and when the manufacturer and the Engineer have mutually agreed that the equipment is in suitable condition for continuous operation.

2. During the equipment start up and initial operating period, the Contractor shall furnish the services of factory trained specialists of the equipment manufacturers for the equipment to assist in the start-up and operation of the equipment.

C. Training:

1. As part of these services, the City will provide the necessary personnel to be trained in the operation and maintenance of the equipment. Training shall occur after the initial operational period is complete.

2. The training shall consist of both classroom and field instruction. The purpose of field instruction shall be to reinforce topics covered in the classroom and to identify the location of any valves, pushbuttons, control panels switches, and other equipment required for operation; and to identify the location of any maintenance equipment such as grease fittings, oilers, isolation valves, safety lockout switches, and other equipment.

3. All training shall take place at the Work Site at a place specified by the City and shall be conducted by qualified training specialists.

4. Separate training sessions shall be conducted for City mechanical operations and maintenance personnel and for City electronic and electrical maintenance personnel.

5. The Contractor shall coordinate the manufacturers training services with the City and the Engineer, providing a minimum of fourteen (14) days prior notice of training, subject to the approval of the Engineer and the City.

6. In order to provide training for an adequate number of City operation and maintenance personnel, a minimum of two 8-hour training days shall be provided for each item of equipment, unless otherwise specified in the Contract Documents.

7. Training shall be limited to no more than three days per week. No training shall be conducted on Mondays and Fridays.

8. The Contractor shall deliver all training material to the Engineer and the City a minimum of 14 days prior to the scheduled training.

D. Lesson Plans:

1. The Contractor shall submit the equipment manufacturer's lesson plans, which shall include specific information about each item of equipment or equipment system, including controls. Lesson plans shall include but not be limited to the following information and meet the following requirements:

a. The Contractor shall submit the equipment manufacturer's lesson plans for approval by the Engineer no less than sixty (60) days prior to the date that the training is to take place.

b. Lesson plans shall indicate the estimated duration of each segment of the training and the training audience that the instruction is to address. The training audience refers to City mechanical operation and maintenance personnel and City electronic/electrical maintenance personnel, as appropriate.

c. The lesson plan shall indicate when training aids are used or referred to during the course of instruction.

d. An outline of required lesson plan contents is included below:

2. Equipment Description:

a. Purpose and function of equipment and auxiliary equipment and systems.

b. Physical arrangement of equipment components and electrical supply.

c. General function of controls, including automatic and manual operation, interlocks, and shutdowns.

3. Equipment Operation:

a. Operating requirement for equipment to perform satisfactorily.

b. Typical operating characteristics.

c. Start-up and shutdown procedures.

d. Use of controls.

4. Equipment Monitoring:

a. Recommended routine instrument readings and operational checking.

b. Early warning signs of developing operational or equipment problems.

c. Procedures for handling non-routine problems such as alarms, power failures, component failures, etc.

5. Equipment operational trouble-shooting procedures.

6. Safety and Housekeeping:

a. Safety features of the equipment.

b. Safe practices.

c. Housekeeping practices.

7. Description of the use of the equipment manufacturer's O&M Manual as regards operation.

8. Preventive Maintenance Requirements:

a. Maintenance needs for equipment.

b. Identification of procedure to satisfy maintenance need (relate to equipment manufacturer's O&M Manual, which should have detailed descriptions of maintenance procedures).

c. Outline or summarize procedures.

d. Recommended schedule for performing preventive maintenance.

e. Provide preventive maintenance record forms (if available).

9. Maintenance Inspection Program:

a. Parts, components and areas of equipment to inspect for routine preventive maintenance.

b. Recommended frequency of inspection.

c. Inspection procedures.

d. Problem identification.

10. Maintenance Trouble-shooting:

a. Sections in O&M Manual detailing trouble-shooting procedures.

b. Summarize trouble-shooting procedures.

c. Testing equipment used in trouble-shooting.

1) Demonstration of use of specialized testing equipment if supplied with equipment.

2) Other testing equipment.

d. Tests used to verify trouble-shootings findings.

11. Disassembly and Assembly:

a. Summarize disassembly and assembly procedures.

b. O&M Manual coverage of subject.

c. Testing to verify success of corrective maintenance.

12. Equipment Calibration:

a. Calibration needs and tolerances.

b. Calibration equipment.

c. O&M Manual listing of calibration ranges, tolerances and settings.

13. Name, address and telephone number of nearest parts supply house and nearest repair service center.

14. Warranty information and service contract description, if applicable.

E. Training Aids:

1. Training aids shall be used as an integral part of the training program. Training aids shall include text and/or pictorial handouts specific to the

equipment supplied. Handouts shall be legible and printed on good quality stock. Handouts shall be submitted when lesson plans are submitted.

2. Additional training aids shall be used for maximum training effectiveness and shall include the following as appropriate:

   a. Audio-visual aids, for example, videos, PowerPoint presentations, flow charts, posters, diagrams, and catalogue cuts.

   b. Models and samples, for example, cutaways, spare parts, tools, miniature models, equipment assemblies, and damaged parts.

3. The use of additional training aids shall be identified in the lesson plan, and a description of the additional training aids shall be given.

1.06 QUALITY ASSURANCE

A. The Contractor shall submit the equipment manufacturer's documentation of the qualifications of their proposed training specialists for approval by the Engineer sixty (60) days prior to the date of proposed training. The documentation shall include the experience of the training specialists in operation and maintenance of the equipment and a summary of training experience.

B. Only those training specialists whose qualifications have been approved by the Engineer shall conduct training.

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the commissioning requirements. including requirements for commissioning of facilities and facility systems to verify compliance with design, including optimum energy efficient operations. This Section includes requirements for commissioning activities and documentation in compliance with the sustainability certification system, if used.

B. Commissioning does not take away from, or reduce, the Contractor's responsibility to provide a finished and fully functioning product and installation as per the Contract Documents.

C. This Section in no way diminishes the responsibility of the Contractor in performing all aspects of work and testing as outlined in the Contract Documents.

D. Section Includes

1. Building commissioning of the following systems:

a. HVAC

1) HVAC components and equipment.

b. Process Systems

1) Process Equipment

E. Attachments

1. Attachment A: Equipment and System Schedule

F. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4

PART 3 EXECUTION.....5
3.01 Examination / Preparation 5
3.02 Implementation 5
3.03 Field Testing / Quality Control 6
3.04 Startup / Demonstration 6
3.05 Adjusting / Protection / Cleanup.....6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Commissioning Plan

1. The Commissioning Plan provides guidance in the execution of the commissioning process. After the initial construction phase Commissioning kickoff meeting, the Contractor will update the plan. This plan is a living document that must evolve and expand as the Project progresses.

2. The Commissioning Plan shall include:

a. Description of the facility and Project.

b. Description of the commissioning process and associated deliverable documents.

c. Description of equipment and systems to be commissioned.

d. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.

e. Sampling frequency for equipment to be tested.

f. Identification of prerequisites/tasks that must be completed before the next operation can proceed.

g. Organization Chart and Contact List.

h. Description of roles and responsibilities of Commissioning team members.

i. Description of observations to be made and reported on during testing and witnessing of testing by all parties involved in the Project.

B. Commissioning Schedule: Contractor shall provide construction schedules to DEP, in accordance with Section 01 32 10 - Progress Scheduling.

1. The Contractor shall develop and submit a schedule identifying the commissioning process and provide commissioning scheduling information to the Engineer for review and planning activities.

2. The Contractor shall incorporate the commissioning activities into the Project CPM schedule.

1.06 QUALITY ASSURANCE

A. The Contractor shall have a Commissioning Agent (CxA) on staff who shall be responsible for commissioning issues compliance and coordination.

1. The CxA shall be a Professional Engineer with five years of commissioning experience on projects of similar complexity.

1.07 SUBMITTALS

A. Commissioning Kick-off Meeting Minutes.

B. Commissioning Plan

1. Submit within 180 consecutive calendar days of Notice to Proceed.

2. Update as necessary during the work to reflect the progress on the components and systems.

C. Commissioning Schedule

1. Submit concurrent with Commissioning Plan.

2. Update as necessary during the Work to reflect the progress on the components and systems.

D. Functional performance test procedures and forms: Submit minimum 30 calendar days prior to testing.

E. Deficiency Report and Resolution Record

1. Document items of non-compliance in materials, installation or operation. Document the results from start-up/pre-functional checklists, functional performance testing, and short-term diagnostic monitoring. Include details of the components or systems found to be non-compliant with the drawings and specifications. Identify adjustments and alterations required to correct the system operation and identify who is responsible for making the corrective changes.

2. Update as necessary during the work to reflect the progress on the components and systems.

F. Final Commissioning Report

1. Compile a Final Commissioning Report. Summarize all of the tasks, findings, conclusions, and recommendations of the commissioning process. Indicate the actual performance of the facility systems in reference to the DEP's Project requirements and Contract documents. Include completed pre-functional inspection checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations, and a summary of commissioning activities.

G. Operation and Maintenance (O&M) Manual Submittals

1. Contractor shall provide O&M manuals to DEP, in accordance with Section 01 78 25 – Operation and Maintenance Manuals.

H. Training

1. Contractor shall provide training in accordance with Section 01 79 05 – Equipment Start-up and Training.

I. Spare Parts

1. Contractor shall provide spare parts to DEP, in accordance with Section 01 78 24 – Spare Parts and Maintenance Materials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Commissioning Process

1. The following provides an overview of the Commissioning tasks during Project construction and the general order in which they occur.

a. Construction-phase Commissioning begins with a Commissioning Kickoff Meeting, conducted by the CxA in accordance with Section 01 31 15 – Project Coordination, where the Commissioning process is reviewed with all the Commissioning Team Members.

b. Additional meetings may be required throughout construction, scheduled by the CxA in accordance with Section 01 31 15 – Project Coordination, with necessary parties attending to plan, scope, coordinate and schedule future activities and resolve open Issues.

c. The Engineer will review the Contractor submittals and provide comments to the Contractor for inclusion in their review. The reviewed submittals will include all commissioned equipment information, including detailed startup procedures, and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems.

d. The CxA works with the CM and the Engineer in developing Pre-functional and Functional Test documentation formats.

e. Periodically throughout the construction process, the CxA will perform site visits to observe component and system installations.

f. The checkout and performance verification generally proceeds from component level to equipment to systems and intersystem levels. Pre-functional (Installation) Checklists are to be completed before Functional Performance Checklists.

g. The Contractor shall, with guidance from the CxA, execute and document the Pre-Functional (Installation) Checklists and perform startup and initial checkout of equipment and systems. The CxA documents that the checklists and startup are completed according to the approved plans. This will include the CxA witnessing selected assembly markups, portions of the startup of selected

equipment, and spot checking the Pre-Functional (Installation) Checklists.

h. The CxA develops specific equipment and system Functional Checklists. The Contractor receives a copy of the procedure through the Commissioner. The CxA may request additional design narrative from the Commissioner and Controls Contractor, depending on the completeness of the Basis of Design and sequences provided within the design documents.

i. The Functional Checklists are executed by the Contractor and witnessed and documented by the CxA.

j. Items of non-compliance in material, installation startup, and operation are corrected and the equipment or system is rechecked. The CxA will maintain an Issues Log to track Issues and Issue resolution.

k. The CxA will review the Operation & Maintenance documentation for completeness.

l. Completion of Commissioning is required for Substantial Completion.

m. The Final Commissioning Report shall be submitted to the Engineer within 30 consecutive calendar days after substantial completion.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Attachment A – Equipment and System Schedule

The following equipment and systems shall be commissioned in this Project.

System	Equipment	Check
HVAC System	Exhaust fan and damper	
Process Systems	Flow monitoring	
	Control and isolation valves	

NO TEXT ON THIS PAGE

SECTION 02 24 20 – SOIL SAMPLING AND ANALYSIS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, tools, and equipment to perform all operations necessary to characterize, classify and determine the requirements for handling, offsite reuse and disposal of any excess materials to be excavated.

B. Soils shall be reused onsite without sampling. If excess soils are generated that cannot be reused onsite as backfill or regrading purposes, the primary method of characterizing soils shall be through ex-situ sampling for offsite beneficial use. Stockpiling of excavated material on-site and ex-situ sampling will be allowed with written approval from the Engineer.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	6
1.06	Quality Assurance	8
1.07	Submittals	8
1.08	Delivery, Storage, and Handling	16
1.09	Spare Parts, Special Tools, and Supplies	19
1.10	Warranty	19
PART 2	PRODUCTS	19
2.01	Manufacturers	19
2.02	Materials / Equipment	19
2.03	Fabrication / Assembling / Finishes	19
2.04	Source Quality Control / Shop Tests	19
PART 3	EXECUTION	19
3.01	Examination / Preparation	19
3.02	Implementation	20
3.03	Field Testing / Quality Control	20
3.04	Startup / Demonstration	20
3.05	Adjusting / Protection / Cleanup	20

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental, Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 01 74 20 – Construction Waste Management

D. Section 31 23 23 – Fill

E. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. Definitions

1. Analyte-free Water: Water containing less than the detection limits for volatile organics, pesticides, PCBs and inorganics. Compliance shall be verified either by the supplier or by an analytical laboratory.

2. Case-Specific Beneficial Use Determination (BUD): Under 6 NYCRR Part 360, Section 360.12(d), NYSDEC sets forth the requirements for petitioning NYSDEC to obtain a Case-Specific BUD, and the criteria for reviewing, granting, or denying of the BUD. For reuse of a solid waste to be determined a beneficial use, the petition must satisfy all criteria outlined under 6 NYCRR Part 360, Section 360.12(d).

3. Composite Sample: Composite sampling is comprised of grab samples which are initially collected from within a grid area and then combined into a single sample. This sample is representative of the entire grid area from which the grab samples were collected.

4. Excavated Material: All material regardless of its nature, except rock or boulders that have been excavated.

5. Ex-situ Soil Sampling: Sampling of soil that has been excavated and stockpiled.

6. Fill: Soil and similar material excavated or brought to the Project Site for the purposes of construction. All fill material must meet the requirements of Section 31 23 23 – Fill. Fill from an off-site source shall be non-hazardous.

7. Grab/Discrete Sample: A single sample is collected at a particular time and place that represents the composition of the soil only at that time and place.

8. In-situ Soil Sampling: Sampling of soil prior to excavation and most representative of undisturbed conditions.

9. New York City Metropolitan Area Waste Impact Zone: The area encompassing the City of New York and the counties of Nassau, Suffolk, Putnam and Westchester, as per 6 NYCRR Part 360.2 Definitions.

10. Pre-Determined Beneficial Use for fill material: Under 6 NYCRR Part 360, Section 360.13(b) Waste cessation. “Excavated material ceases to be solid waste in accordance with the following:

a. Fill Type 1 generated outside of the New York City Metropolitan Area Waste Impact Zone (NYCMAWIZ) – once a determination has been made that the material is Fill Type 1;

b. Fill Type 1 generated within Nassau, Suffolk, Westchester and Putnam Counties – once the material is delivered to the site of reuse;

c. Fill Type 1 cannot be generated within the City of New York;

d. Fill Type 2 and Fill Type 3 generated outside of the NYCMAWIZ – once a determination has been made that the material is Fill Type 2 or Fill Type 3;

e. Fill Type 2 and Fill Type 3 generated within the NYCMAWIZ – once the material is delivered to the site of reuse;

f. Fill Type 4 and Fill Type 5 – Once the material is delivered to the site of reuse."

g. Under 6 NYCRR Part 360, Section 360.12(c)(1)(iv)(a), "Excavated material used to backfill the same excavation or as grade adjustment in areas of similar physical characteristics on the site of generation. If the material exhibits visual or historical evidence of contamination (including odors) and will be used in an area with public access, the material must be covered with pavement, foundation, or with a minimum of 12 inches of soil or fill that meets the criteria to be used as Fill Type 1 and Fill Type 2" as defined in Subdivision 360.13, Special requirements for pre-determined beneficial use of fill material.

11. Qualified Environmental Professional (QEP): "a person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a property or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified" in 6 NYCRR Part 360.The QEP must:

a. Hold a current professional engineer's or a professional geologist's license or registration issued by the State or another state, and have the equivalent of three years of full-time relevant experience; or

b. Be a site remediation professional licensed or certified by the Federal government, a state or a recognized accrediting agency, to perform investigation or remediation tasks consistent with department guidance, and have the equivalent

of three years of full-time relevant experience. Examples include:

1) Licensed Site Professional, by the State of Massachusetts;

2) Licensed Environmental Professional, by the State of Connecticut;

3) Licensed Site Remediation Professional, by the State of New Jersey;

4) Qualified Environmental Professional by the Institute of Professional Environmental Practice (now the Board of Certified Safety Professionals); or

5) Certified Hazardous Materials Manager, by the Institute of Hazardous Materials Management.

c. An Environmental Professional (EP) as defined in Section 01 35 27 – Environmental, Health and Safety Requirements may meet the requirements of a QEP.

12. Treatment, Storage, Disposal Facilities (TSDF): Includes, but is not limited to, all permitted facilities that treat, store, or manage disposal of regulated waste.

13. Waste Classification:

a. Regulated Solid Waste:

1) Construction and Demolition (C&D) Debris: Waste resulting from the construction, remodeling, repair and demolition of structures, buildings and roads. Such waste includes fill material, demolition wastes, and construction wastes. Materials that are not C&D debris (even if generated from construction, remodeling, repair, and demolition activities) include municipal solid waste, friable asbestos-containing waste, corrugated container board, electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers, fluorescent lights, furniture, appliances, tires, drums, fuel tanks, containers greater than 10 gallons in size, and any containers having more than one inch of residue remaining on the bottom.

2) Hazardous Solid Waste: Material shall be considered a characteristic hazardous solid waste when it exhibits any of the following: ignitability, corrosivity, reactivity, or toxicity for Volatile Organic Compounds (VOCs), semi-VOCs (SVOCs), metals, pesticides, or herbicides, as defined in 6 NYCRR Part 371 or 40 CFR Section 261. Under New York State (NYS) regulations, a material that contains 50 ppm or greater of PCBs is considered a hazardous waste. The Environmental Protection Agency (EPA) considers a

material that contains 50 ppm or greater of PCBs to be a Toxic Substances Control Act (TSCA)-regulated waste. All hazardous waste shall be considered unsuitable for reuse, and shall be disposed of at an approved permitted hazardous waste landfill.

3) Non-Hazardous Contaminated Waste: Non-hazardous contaminated waste includes soil commingled with or containing other waste, petroleum and petroleum products, except those present solely as a result of normal use of vehicles on roadways or parking areas, and pesticides except those present solely as a result of the proper application in normal agricultural or horticultural practices. Physical evidence that soil is contaminated shall include visual identification of waste, chemical odors, vapor emission, and chemical staining.

4) Non-hazardous Petroleum-contaminated Waste: Exhibits a discernible petroleum-type odor, contains visible petroleum product, or may be associated with a reported spill.

b. Non-regulated Solid Waste: This applies to materials that, before being beneficially used (as determined by the NYSDEC or applicable out-of-state regulatory agency) were solid waste. Material used as described in 6 NYCRR Part 360, specifically Section 360.12(c) and Section 360.12(d) is no longer considered solid waste.

B. Reference Standards

1. EPA QA/G-4, Guidance on Systematic Planning Using the Data Quality Objectives Process, February 2006 or latest revision

2. USEPA Office of Solid Waste, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-846), Third Edition, December 1996 with updates or latest revision

3. USEPA 40 CFR Chapter I, Subchapter R, - Toxic Substance Control Act (TSCA), Part 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

4. NYSDEC regulations, 6 NYCRR Part 360, Solid Waste Management Facilities General Requirements

5. NYSDEC regulations, 6 NYCRR Part 371, Identification and Listing of Hazardous Wastes (40 CFR Part 261)

6. NYSDEC regulations, 6 NYCRR Part 375, Environmental Remediation Programs

7. American Society for Testing and Materials (ASTM) Standards:

a. D422 - Method for Particle-Size Analysis of Soils.

b. D1556 - Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

c. D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

d. D6938 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.05 DESCRIPTION

A. Sampling Requirements

1. Fill Material:

a. Material to be excavated and proposed for reuse as fill under a Pre-Determined Beneficial Use meets the requirements of 6 NYCRR Part 360, Section 360.13(a), Applicability, Section 360.13(b), Waste Cessation, or Section 360.12(c)(1)(iv)(a). When sampling is necessary for offsite, out-of-state reuse or disposal, excess soils shall be sampled for RCRA characteristics, including ignitability, corrosivity, reactivity, PCBs, asbestos, and TCLP for metals, SVOCs, VOCs, and pesticides and herbicides, in addition to any other parameters required by the reuse/disposal facility. Frequency of sampling shall be as required by the out-of-state reuse/disposal facility.

2. When relocating soils on the same site, hazardous soils, non-soil wastes, or hot spots, as evidenced by visual observation, hand-held instruments or analytical results, must not be incorporated. All such material shall be removed for disposal off-site. Soil sample results greater than 5 ppm lead by Toxicity Characteristic Leaching Procedure (TCLP) shall be reported to the Engineer immediately.

B. Off-Site Beneficial Use Facility / TSDF

1. The Contractor shall submit the name(s) of the selected off-site soil beneficial use facilities / TSDFs and their location(s) to the Engineer for approval as part of the Soil Excavation, Treatment Reuse, and Disposal Plan specified in Section 31 23 16 – Excavation.

2. Reuse of excavation spoils off-site must be prioritized over disposal. TSDFs shall only be approved where reuse options are not available.

3. Note that some companies may have multiple beneficial use facilities or TSDFs, each possessing differing requirements regarding the types of materials accepted, the specific analytical testing parameters that must be performed for each material, and the frequency of sampling required for each material. It is the Contractor's responsibility to determine the types of materials accepted, specific waste acceptance criteria (analytical

parameters) and frequency of testing requirements for each of its proposed facilities.

4. The Contractor shall confirm the location(s) and permit status, as well as check for outstanding violations and enforcement actions at each selected beneficial use facility / TSDF. The Engineer shall verify the information provided by the Contractor for each facility prior to approval.

5. If an approved facility is not available during construction, the Contractor shall be fully responsible for procuring alternate approved facilities at no additional cost to the City. Any additional sampling and analysis required and labor involved in selecting new facilities after the initial reuse or disposal facilities are accepted shall be the responsibility of the Contractor.

C. Project Conditions

1. Stockpiling: No stockpiling of excavated material on-site or ex-situ sampling of excavated soils will be allowed without written approval from the Engineer. Soils stockpiled for onsite reuse do not require sampling as they meet the conditions in Article 1.05.A.1.b.

   a. If stockpiling is considered necessary, and approved by the Engineer, sampling shall be conducted by collecting representative grab samples throughout the soil stockpile. Surface soil shall not be used as sampling material. Sampling frequency and analytical requirements will at a minimum conform to the sampling requirements specified herein. Multiple samples shall be classified based on biased worst case to be considered fully representative of the soils being sampled for reuse in New York State. The Contractor is also required to satisfy the specific sampling requirements of the beneficial use facility or TSDF.

   b. During stockpiling activities, the Engineer may identify quantities within each 300 cubic yard portion that differ in appearance from the bulk of the material as per 6 NYCRR Part 360, Section 360.13(e)(1) Table 1. In this case, the Engineer will direct the Contractor to segregate these variable materials for separate stockpiling on-site. The Contractor shall sample each stockpile that differs in appearance from the bulk of the material.

   c. All stockpiles of excavated materials shall be managed on site as required in Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control.

2. Decontamination of Sampling Equipment: All sampling equipment shall be certified clean or precleaned, prior to collection of each sample, by the following method:

   a. Wash all sampling equipment, secondary containers (e.g., mixing bowls for composite sampling) and aluminum foil

with non-phosphate laboratory grade detergent and distilled water.

b. Triple rinse with distilled water.

c. Rinse with isopropyl alcohol, or if samples are visibly contaminated with petroleum use a solvent, such as hexane or other alternate approved by the Engineer.

d. Triple rinse with analyte-free water.

3. Disposal of Decontamination Solutions: Collect all decontamination solution and dispose of it through a licensed chemical waste disposal service if unsuitable for treatment on-site by incorporation into existing on-site treatment processes as defined in Section 31 23 19 – Dewatering.

1.06 QUALITY ASSURANCE

A. Laboratory Requirements:

1. The Contractor shall provide the services of a laboratory certified by the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) to perform applicable testing and chemical analyses for the duration of the Work.

2. The laboratory shall also meet the certification requirements of the beneficial use facility / TSDF that will be utilized by the Contractor for the duration of the Work.

B. Permits and Regulations:

1. The Contractor shall obtain all necessary permits and perform all work in compliance with applicable requirements of OSHA, and other governing authorities having jurisdiction including all federal, state and local governing authorities.

C. Field QA/QC Samples:

1. Shall be collected and analyzed in accordance with the protocol for site samples.

2. The number of QA/QC samples required for a quantity of soil shall meet all beneficial use facility / TSDF requirements, and the approval of the Engineer.

D. Sample Turn-Around: The Contractor shall provide for prompt sampling and turn-around of analysis so as not to delay the project. If a turn-around time of less than ten (10) business days is required due to delays in construction scheduling or other constraints, Contractor shall provide for such at no additional cost to the City.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other materials, including, but not limited to, those listed below for the approval of the Engineer. Where the Contractor's QEP determines that no sampling is required, at a minimum a Field Sampling Plan (FSP) per Article 1.07.A.2 shall be submitted describing a procedure

for encountering potentially contaminated material during excavation as described in 1.05.A.2.

1. DEP Environmental, Health, and Safety (EHS) Drilling and Boring Checklist: The Contractor shall work with the Engineer and BEDC to complete all necessary portions of the EHS Drilling and Boring Checklist. This shall be completed and submitted to the Engineer a minimum of 60 days prior to the proposed commencement of the drilling/boring work. No drilling/boring work shall be performed at the Site without completion and written approval of the EHS Drilling and Boring Checklist from the Engineer. Updates to the checklist shall be completed and submitted whenever there is a change of the drilling subcontractor or scope of drilling/boring work; or new EHS hazards have to be considered in performing the work.

2. Field Sampling Plan (FSP): A FSP, prepared by the Contractor's QEP, shall be submitted to the Engineer for approval 30 days following notice to proceed. The Engineer will approve the FSP only if it clearly provides a means to collect the information necessary to allow for classification of all material proposed for excavation and if it will ultimately generate data necessary for on-site reuse as per 6 NYCRR Part 360, Section 360.13, or Section 360.12, or to gain approval from the Contractor's chosen off-site beneficial use facility / TSDF. No sampling shall be conducted until the Engineer has reviewed and formally approved the FSP in writing. The FSP shall include the following at a minimum:

    a. Locations and protocols for the collection and analysis of samples that represent all soils to be excavated. Collection methods and chosen locations shall be sufficient to pre-characterize the soil prior to excavation unless post-excavation sampling is approved by the DEP.

    b. Each composite sample will be comprised of multiple (3-5) discrete samples that are representative of the horizontal and vertical extent of the excavation footprint.

        1) VOC analysis requires two (2) discrete (biased worst case) VOC samples to be collected for every one (1) composite sample.

        2) When soils are visibly heterogenous, composite and discrete (for VOCs), samples will be obtained to represent each visually different stratum or section of the excavation site, regardless of the overall excavation volume.

    c. A detailed outline of the BUD or beneficial use facility / TSDF requirements for sampling, testing and analysis including specific number and types of samples per unit volume of soil to be excavated.

d. Parameters analyzed for soils to be reused or disposed, as defined in 6 NYCRR Part 360, Section 360.13 (e), in addition to any other parameters required by the beneficial use facility / TSDF.

e. A scaled site map showing:

1) existing fixed landmarks;

2) proposed excavation limits or area to be excavated divided into distinct vertical and horizontal grids, identifying the volume of soil or fill that each sample will represent;

3) specific sampling locations that are representative of the entire depth of excavation and that will conform to the applicable sampling frequency requirement;

4) identification numbers of the sample grids, relative depth, sampling intervals, and volumes reflective of the Contractor's excavation method.

a) Sampling intervals shall account for existing subsurface data, historic sampling information, including descriptions, depths, orientation, and location of material of potentially different classifications, and shall minimize undue mixing of excavated soils.

f. Proposed sampling, handling, preservation, and storage of equipment procedures, including transfer procedures, and sampling equipment decontamination procedures.

g. Proposed analytical methods, in accordance with SW-846, latest edition, for the analyses to be performed. Contractor shall confirm the analytical method and laboratory selected is accepted/certified by the receiving facility, including beneficial use facility/TSDF, meets the regulatory requirements, and can meet the required reporting limits for comparison to beneficial use facility/TSDF accepting criteria and other limits, as applicable.

h. Procedures for assessing precision, accuracy, degree of representation, comparability and completeness of samples and data, including performance audits and proposed protocols for corrective measures where problems are identified in accordance with Article 1.06 – Quality Assurance.

i. Schedule of field inspections.

j. A statement that the sampling program is in accordance with the Contract requirements.

k. Manufacturer, catalog data and calibration records of all analytical equipment to be used on-site.

l. Name and address of analytical laboratory, copy of laboratory certification, and Quality Assurance Manual.

m. Description of field and laboratory QA/QC samples and any additional requirements of the reuse or disposal facilities.

n. The organizational structure of the Contractor's and all subcontractors' quality management (QM) personnel, including:

1) names, titles and contact information;

2) resumes;

3) responsibilities;

4) authorities; and

5) qualifications.

3. Field Sampling Summary Report (FSSR): A FSSR, prepared by the Contractor's QEP, shall be submitted to the Engineer for review in a timeframe, dependent on the extent of the data collection effort, determined by the Engineer at the time. Contractor shall be solely responsible for ensuring that the FSSR meets all requirements of Contractor's proposed beneficial use facility/TSDF. The FSSR shall contain all laboratory analytical results obtained from the field sampling event and shall allow the Engineer to determine if the soil is acceptable for beneficial use or requires disposal at a permitted TSDF. At minimum, the FSSR shall include the following information:

a. A detailed account of any field procedures used which deviated from or were in addition to those established in the FSP.

b. A summary table listing the analytical results (with individual ID for each sample) with highlighted exceedances of 6 NYCRR Part 360, Section 360.13 (f), Table 2: Fill Material Beneficial Use, all Beneficial Use Facility/TSDF acceptance criteria, RCRA characteristics, and any other screening criteria identified and approved by the Engineer during the Project, as applicable.

c. Location of each sampling point (using individual ID from analytical results summary table) on the scaled site map created in the FSP.

d. A complete set of field notes collected and maintained by the Contractor during sampling. The field notes shall be made available to the Engineer during the sampling program.

e. Boring or probe logs from each sampling location containing a continuous stratigraphic description of all material encountered. Descriptions of material shall include, but not be limited to, color, odor, staining, field screening measurement, relative grain size distribution, material composition, moisture content, and cohesive properties.

f. Depth intervals for each sample, whether a grab or composite, and any special notes, which are included on the laboratory chain-of-custody forms.

g. Copies of all laboratory chain-of-custody forms for samples that are collected for analysis.

h. Analytical Results: The Contractor shall submit analytical results for sampled soil material to the Engineer within three (3) business days of receiving such data from the laboratory. Analytical results data shall be managed by utilizing a computer spreadsheet or database program compatible with NYSDEC requirements for EQuIS submittals as approved by the Engineer. Data shall be organized in such a way that all samples may be tracked from collection through analysis.

1) The analytical results generated for a ten (10) business day turn-around time deliverable shall include a Form I (or equivalent) showing compounds analyzed for, and concentrations detected, and associated chain-of-custody reports to the Engineer.

2) The final data package generated by the laboratory shall include the following information:

a) A Form I showing pertinent physical data presented in concise, easy to follow formats (i.e., sample number, laboratory ID, client, date of sample preparation, date analyzed, percent moisture, dilution factor, sample matrix, units, undetected and detected compounds, etc.).

b) Reference to analytical methodology used.

c) General discussion including a description of sample types, tests performed, any problems encountered, and any general comments (case narrative).

d) Data from each discrete sample reported using cross-referencing between site samples and quality control samples and including all pertinent dates, information and reporting limits.

e) Associated quality control samples such as blanks, spikes and spike duplicates, laboratory duplicates,

laboratory control samples, field duplicates and appropriate check standards.

f) Copies of chain-of-custody sheets.

3) The information must be delivered on CD or via electronic mail to the Engineer. All electronic data must be certified to be virus-free.

B. Soil Excavation, Reuse, Transport and Disposal Plan (SERTD Plan): Submit a SERTD Plan to the Engineer for approval at least 30 calendar days prior to the start of excavation. The SERTD Plan shall include two protocols: the Excavation Protocol and the Reuse, Transport and Disposal Protocol.

1. The Excavation Protocol shall include, but not be limited to, the following:

a. Limits of excavation

b. Excavation methods

c. Protection methods:

1) Sheeting and bracing

2) Fencing, bridging and decking

2. The Reuse, Transport and Disposal Protocol shall address the following waste classifications defined in Section 02 24 20 – Soil Sampling and Analysis: hazardous solid waste; non-hazardous contaminated waste; non-hazardous petroleum-contaminated waste; non-regulated solid waste, and construction and demolition (C&D) debris. The Protocol shall include the following:

a. Details on proposed reuse:

1) Identities of beneficial use facility (ies) with copy (ies) of their regulatory approvals, as applicable. Unless otherwise reused under Pre-Determined Beneficial Use, details shall include all supporting back-up information sent to and received from NYSDEC or other applicable out-of-state agency. See Section 02 24 20 - Soil Sampling and Analysis for on-site reuse criteria. When reusing soils on site, details of temporary (stockpile) storage and the location(s) of reuse shall be identified.

2) As applicable, the requirements of each beneficial use facility / treatment, storage, and disposal facility (TSDF) for sampling, including analytical parameters, frequencies, protocols, and minimum detection limits.

b. Transportation details:

1) Identities of waste transporters; supporting NYSDEC Part 364 Waste Transporter Permit(s) and other out-of-state transporter permits required to transport the wastes to the

TSDFs; or for use of public roadways if temporary off-site storage becomes necessary.

c. Disposal details:

1) Identities of TSDFs solicited including names and locations, insurance certificate, permit documentation including the types of materials allowed and not allowed, and chemical and physical material acceptance criteria. If no concentrations are indicated, then the facility must indicate the types of material that it is allowed to accept under its permit. Treatment, storage, or disposal of any waste generated by excavation Work shall be at a facility permitted to accept such waste by an authorized state or local government agency, or the EPA, as applicable.

3. The SERTD Plan shall be coordinated with the Field Sampling Plan (FSP), including beneficial use facilities/TSDF selection, and associated materials acceptance requirements specified in Section 02 24 20 – Soil Sampling and Analysis, as applicable.

4. The SERTD Plan shall be prepared in accordance with all applicable Federal, State and local hauling and disposal codes and regulations

5. Reuse of excavation spoils either on-site or off-site must be prioritized over disposal. TSDFs shall only be approved where reuse options are not available.

6. Under separate cover, additional waste disposal documentation submittals for DEP signature as generator. The Contractor shall provide waste profiles, facility letters of acceptance of DEP waste, advance copies of waste manifest(s), and Land Disposal Restriction (LDR) Notification and Certification Form (if hazardous waste) for the Engineer's review and approval and DEP signature as generator, where applicable.

C. Manifest Requirements and Submittals: Manifests shall include measurements of the volume of all excavated material to be removed from the site prior to transporting to an approved beneficial use facility/ TSDF. The Contractor shall also prepare all vehicles and manifests necessary for transporting all material. The Contractor shall comply with all Federal, State and local regulations regarding the transport of hazardous and non-hazardous waste.

1. Applicable Regulations: All Contract Work that concerns the transport of hazardous and non-hazardous waste shall comply with the appropriate EPA and NYSDEC regulations, and DOT hazardous material transportation regulations.

2. EPA Hazardous Waste Manifest: The Contractor shall obtain an appropriate number of hazardous waste manifest forms (EPA Form 8700-22 (Rev. 3-05) or latest version), sequentially numbered for this Contract based on the quantity of hazardous waste to be removed from site. The name of the generator, transporter and TSDF, and their appropriate EPA identification

number, shall be typed on each form. All other pertinent information shall be included on the manifest. A copy of the partially completed manifest including the above information shall be submitted for approval at least 3 weeks prior to commencement of excavation.

a. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved TSDF by the hazardous waste transporter.

3. Non-hazardous Waste Manifest: Manifests shall be provided for each truckload of non-hazardous waste removed from the site, including soils destined for reuse. The form of the manifest shall be approved by the Engineer. Non-hazardous waste shall be transported in accordance with all applicable local, State and Federal DOT regulations by properly licensed and permitted waste haulers.

a. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved beneficial use facility / TSDF by the non-hazardous waste transporter.

4. The Contractor shall submit written evidence that selected beneficial use facilities / TSDFs have accepted or will accept the materials generated during excavation. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with Federal and State requirements and with associated documentation (e.g., waste profile and Hazardous Waste LDR Notification and Certification Form, as applicable). Copies of completed and signed waste manifests from beneficial use facilities / TSDFs shall be provided to the Engineer within 30 days of waste shipment off-site.

5. Bill of Lading: Bills of Lading shall be provided for all uncontaminated soils destined for reuse off-site. Uncontaminated soil shall be removed by a properly licensed hauler.

6. Notification to the NYSDEC must be made prior to the first load greater than 10 cubic yards is planned to be transported from the site of excavation directly to the site of reuse.

a. At least five days in advance of transfers of Fill Types 2, 3, 4 and 5 generated in, imported to, or relocated within the City of New York.

b. At least five days in advance of transfers of Fill Type 4 and Fill Type 5 anywhere in the State of New York.

The Notification of Fill Transfer for Reuse form (NYSDEC Division of Materials Management, version 03/24 or latest) will be sent to the NYSDEC Regional Office in which the destination is located. The form must be certified by a Qualified Environmental Professional (QEP). In the event the QEP is not a Professional

Engineer or Geologist licensed in New York State, the QEP's basis for credential must be attached to the form.

D. Monthly Submittals: Monthly soil generation/diversion (onsite and offsite reuse)/disposal data shall be tracked in accordance with Section 01 35 27 – Environmental Health and Safety Requirements, Article 1.07.C Monthly Contractor EHS Report, and 01 74 20 – Construction Waste Management.

E. Coordinate all submittals with the Soil Excavation, Reuse, Transport and Disposal Plan (SERTD Plan) required in Section 31 23 16 – Excavation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Sample Identification:

1. All samples shall be identified with a sample label in addition to an entry on a chain-of-custody record. The label shall be identified upon receipt by the laboratory and cross-referenced to the chain-of-custody record.

2. Any inconsistencies shall be noted on the custody record. Laboratory personnel shall notify the Sampling and Analysis Manager immediately if any inconsistencies exist in the paper work associated with the samples, and Contractor shall collect new samples to replace those with inconsistencies which cannot be rectified.

B. Sample Labels: The field team shall complete the following information on a sample label for each sample bottle:

1. Site Name
2. Job Number
3. Sample Number
4. Sample Description
5. Company Name
6. Parameters to be analyzed
7. Date
8. Time
9. Preservation Technique Employed
10. Sample labels shall be attached to the sample bottles

C. Completion of Chain-of-Custody Record:

1. Maintain a chain-of-custody record on all samples. A chain-of-custody record is a printed multi-part form that accompanies a sample or group of samples as custody is transferred from person to person. A chain-of-custody record is a controlled document.

2. As soon as is practical after sample collection, preferably after decontamination, the following information shall be entered on the chain-of-custody form. All information shall be recorded in ink.

a. Project number: Enter the alphanumeric designation assigned by the field team that uniquely identifies the project site.

b. Project name: Enter the site name.

c. Samplers: Sign the name(s) of the sampler(s).

d. Station number: Enter the sample number for each sample in the shipment. This number appears on the sample identification label.

e. Date: Enter a six-digit number indicating the year, month, and day of sample collection.

f. Time: Enter a four-digit number indicating the time of collection in 24-hour time, for example, 13:54 (for 1:54 PM).

g. Matrix/Type: Indicate the type of sample; composite or grab.

h. Station location: Describe the location where the sample was collected.

i. Number of containers: For each sample number, enter the number of sample bottles that are contained in the shipment.

j. Remarks: Enter any appropriate remarks.

k. Sample Shipment:

3. Custody of samples shall be maintained throughout the shipment of samples to the selected laboratory (ies). All samples shall be packaged and shipped daily to ensure that no sample is held at the site more than 24 hours. Samples shall be delivered directly to the laboratory using the following procedures:

a. Use waterproof high-strength plastic ice chests or coolers only.

b. After filling out the pertinent information on the sample label and tag, put the sample in the bottle or vial and screw on the lid. For bottles other than VOC sample bottles, secure the lid with tape (tape on VOC bottles may cause contamination).

c. Place inert cushioning material such as vermiculite or "bubble-wrap" in the bottom of the cooler.

d. Enclose the bottles in clear plastic bags through which sample labels are visible, and seal the bag. Place bottles upright in the cooler in such a way that they do not touch and will not touch during shipment.

e. Put in additional inert packing material to partially cover sample bottles (more than half-way). Place double-bagged crushed ice around, among, and on top of the sample bottles.

f. Fill cooler with cushioning material.

g. Put paperwork (chain-of-custody record) in a waterproof plastic bag and tape it with packing tape to the inside lid of the cooler.

h. Tape the drain shut.

i. Secure lid by taping. Wrap the cooler completely with strapping tape at a minimum of two locations. Do not cover any labels.

j. Attach completed shipping label to top of the cooler.

k. Put "This Side Up" labels on all four sides and "Fragile" labels on at least two sides of coolers containing glass containers.

l. Ship the cooler overnight by commercial carrier (e.g., Federal Express, UPS), laboratory carrier or field personnel to the respective laboratory.

m. Custody forms for the samples shall be signed by the Contractor's designated representative who is relinquishing custody. The custody form shall include the air bill number, method of shipment, and time and date of the transfer of custody.

4. Custody seals shall be applied to the front and back of the sample coolers. A shipping label with return address shall be applied as well as the air express bill and any Department of Transportation (DOT) required labels or markings.

D. Transferring Custody of Samples to Shipper, if applicable: Contractor shall transfer custody of samples to a shipper as follows:

1. Sign, date, and enter time on the chain-of-custody report under "Relinquished by."

2. Make certain that shipper signs the "Received by" entry.

3. Enter name of the carrier under next "Relinquished by" category. Receiving laboratory shall sign "Received for Laboratory by" on lower line and enter date and time.

E. Transferring Custody from Sampler or Shipper to Common Carrier:

1. The shipper or Contractor shall transfer custody of samples to a common carrier as follows:

a. Sign, date, and enter time under "Relinquished by" entry.

b. Enter name of carrier (e.g., UPS, Federal Express) under "Received by."

c. Enter bill-of-lading or Federal Express airbill number under "Remarks."

d. Place the original of the chain-of-custody form in the appropriate sample shipping package. Retain a copy with field records.

e. Sign and date the custody seal. The custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field.

f. Wrap the seal across filament tape which has been wrapped around the hinges of the shipping package at least twice.

g. Fold the custody seal over on itself so that it sticks together.

h. Complete other carrier-required shipping papers.

i. In instances when the Common Carrier will not accept responsibility for handling chain-of-custody forms, the Contractor shall ensure that the record is packed within the sample package.

F. Laboratory Custody Procedures: Once the samples arrive at the laboratory, the Contractor shall ensure that custody of the samples is maintained by laboratory personnel. The laboratory shall, at a minimum, document the chain of custody through each stage of analysis from receipt to final reporting.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Testing shall be in accordance with the sampling requirements of Article 1.05.A.

1. Parameters analyzed for soils to be reused or disposed off-site shall be the RCRA characteristics, including ignitability, corrosivity, reactivity, and Toxicity Characteristic Leaching Procedure (TCLP) for metals, SVOCs, VOCs, and pesticides and herbicides, in addition to any other parameters required by the beneficial use facility or TSDF.
2. If any soil sample results are greater than 5 ppm lead by TCLP the Contractor shall immediately notify the Engineer. (See Section 01 35 45 – Hazardous Materials Control for implementation of a Community Air Monitoring Program (CAMP) in the event that hazardous levels of lead are detected in soil.)

B. Field sampling shall be completed in ample time to prevent delay of the excavation work.

3.02 IMPLEMENTATION

A. When relocating soils on the same Site, hazardous soils, non-soil wastes, or hot spots, as evidenced by visual observation, hand-held instruments or analytical results, must not be incorporated. All such material shall be removed off-site for proper disposal, treatment, and/or reuse as applicable.

3.03 FIELD TESTING / QUALITY CONTROL

A. Sampling frequencies shall be per Article 1.05.

B. Classification of soils for reuse or disposal shall be carried out by the Engineer.

C. Conduct testing in accordance with the approved FSP.

D. Calibrate all instruments in accordance with manufacturer recommendations.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to complete the demolition, removal, disposal and relocation Work.

B. Included, but not limited to, are demolition and removals of existing materials, structures, equipment, or work necessary to install the new Work, as shown and specified and to connect same with existing work in an approved manner. Demolition includes structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical equipment, paving, curbs, walks, fencing, and similar existing facilities.

C. Demolitions and removals which may be specified under other Sections shall conform to requirements of this Section.

D. The Contractor shall obtain all required permits from the City and other agencies having jurisdiction.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	11
3.04	Startup / Demonstration	11
3.05	Adjusting / Protection / Cleanup	11

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 25 10 - Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. 29 CFR 1926 - Safety and Health Regulations for Construction (Subpart T - Demolition)

B. 29 CFR 1910 - Occupational Safety and Health Standards

C. ANSI/ASSE A10 - Construction and Demolition Safety Standards

D. AWS D12.1 - Reinforcing Steel Welding Code

E. NYCDEP - Environmental Health and Safety Policies and Procedures – Vol. III. Control of Hazardous Energy Lock-Out/Tag-Out, or latest version

1.05 DESCRIPTION

A. Protection:

1. Demolition and removal Work shall be performed by competent workers experienced in the various types of demolition and removal Work required. The Work shall be carried through to completion with the prevention of damage to structures and the adjacent property and with due regard to the safety of City employees, work persons on the site, and the public. The Work will be performed so as not to interfere with the use of, and free and safe passage to and from, adjacent structures.

2. The Contractor shall provide, erect and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, work persons engaged in demolition operations, and adjacent construction.

3. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

4. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and construction work is being done, connections made, materials handled or equipment moved. The Contractor shall be responsible for any damage to the existing structure or contents by reason of providing insufficient protection.

5. The Contractor shall take necessary precautions to control dust as required by Section 31 25 10 – Dust, Soil Erosion and Sediment Control. Dust

shall be prevented from rising by wetting demolished masonry, concrete, plaster and similar debris. All portions of the existing buildings affected by the operations under this Section shall be protected by dustproof partitions and other adequate means.

6. The Contractor shall monitor the atmosphere in enclosed areas for the presence of hazardous gases, in accordance with the requirements of this Contract and all applicable laws and regulations.

7. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

8. The Contractor shall carry out all operations so as to avoid interference with operations and work in the existing facilities and the work under other contracts.

9. The Contractor shall be solely responsible for making all necessary arrangements and for performing all necessary work involving the discontinuance or interruption of all utilities or services.

10. Any equipment, piping and appurtenances removed without proper authorization, and that are necessary for the operations of the existing or expanded facilities, shall immediately be replaced to the satisfaction of the Engineer at no cost to the City.

11. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the work by the placement or storage of materials will not be permitted, and all operations shall be conducted with minimum interference to traffic.

12. The Contractor shall repair damage caused by its operations to existing structures and equipment to remain, or to any property belonging to the City or its employees.

13. The Work shall comply with 29 CFR Part 1926 -- Safety and Health Regulations for Construction, applicable provisions and recommendations of ANSI/ASSE A10 -- Construction and Demolition Safety Standards, New York City Construction Code, New York City Electrical Code, all other governing codes and rules, and as specified herein or shown in the Contract Documents.

14. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal.

15. Demolition and removal of hazardous materials shall be in accordance with applicable federal, State and Local regulations.

B. Permits: The Contractor shall obtain all permits from all appropriate regulatory agencies as required for demolition of any building or structure located in Schoharie County, including a Demolition Permit and associated air permit from the Schoharie County Building Department.

C. Condition of Buildings, Structures and Equipment:

1. The City does not assume responsibility for the actual condition of buildings, structures and equipment to be demolished and removed.

2. Conditions existing at the time of inspection for bidding purposes will be maintained by the City so far as practicable. However, there is no guarantee by the City that the number of fixtures, amount of equipment or any other material of value existing at bidding time in the buildings and structures to be demolished will be present in the structures when they are demolished. The Contractor shall have no claim against the City because of the absence of such fixtures and materials.

3. The conditions of existing structures and equipment shown on the Contract Documents is based on visual inspection and a walk-through survey only. Neither the Engineer nor the City will be responsible for interpretations or conclusions drawn therefrom by Contractor.

D. Scheduling: The Contractor shall carry out operations so as to avoid interference with City's operations and work in the existing facilities.

E. Notification: At least 48 hours prior to commencement of a demolition or removal, Contractor shall notify the Engineer in writing of his proposed schedule. City will inspect the existing equipment or facilities and review with the Contractor those items which are to remain the property of the City. No removals shall be started without the permission of the Engineer.

F. Coordination: The Contractor shall coordinate all electrical shutdowns with the Engineer and the DEP's Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

G. Pre-Demolition Meeting:

1. The Contractor shall have a pre-demolition meeting with the Engineer and representatives of other related construction contracts, if any, in the presence of the Resident Engineer, to review all of the work areas that will be affected by the removal of materials from demolition.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to proposed methods, equipment and operating sequences to be used in performance of the demolition and removals work and handling of hazardous materials.

B. The Contractor shall demonstrate how coordination of operations and sequence for shut-off, capping, temporary services, continuation of utility services, and other applicable items will be provided to ensure no interruption of City's operations.

C. Sequence and Schedule: The Contractor shall submit a detailed schedule showing the sequence and duration of demolition activities.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. General:

1. The Work required shall be done with care, and shall include all necessary shoring, bracing, and support to prevent movement, settlement, or collapse of existing structures or facilities. The Contractor shall be responsible for any damage caused by demolition and removal Work to any part or parts of existing structures or equipment designated for reuse or to remain. The Contractor shall perform patching, restoration and new work in accordance with applicable sections of the Specifications, as shown on the Contract Drawings, and as directed and approved by the Engineer.

2. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces, which have holes, scars, chipped or other damaged

surfaces revealed by the removal, shall be repaired by the Contractor with the same or matching materials as the existing surface or as may be otherwise approved by the Engineer.

3. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with Section 31 25 10 – Dust, Soil Erosion and Sediment Control and all governing regulations pertaining to environmental protection.

   a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

   b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the work.

   c. The use of calcium chloride for dust control will not be allowed.

4. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately one inch below the surrounding finished area, and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable sections of the Specifications, as shown on the Contract Drawings, or as directed by the Engineer. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the applicable sections of the Specifications, as shown on the Contract Drawings and as directed and approved by the Engineer.

5. Any materials or items designated to remain the property of the City shall be removed with care and stored at locations designated by the City.

6. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without the prior approval of the Engineer. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor, the City and the Engineer. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation, and shall be protected and stored until required. Material or equipment damaged during removal shall be replaced with similar new material or equipment. Any equipment that is removed without proper authorization and is required for operation in the permanent works shall be replaced at no cost to the City.

7. Wherever piping is to be removed for disposal, the Contractor shall drain the piping and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.

8. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations shall be of the same quality as required for new work of the same type.

9. The Contractor shall confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the Work. The Contractor shall cut and remove insulation and weather protection, and provide temporary weathertight protection as required until new roofing and flashings are installed.

10. The Contractor shall remove enclosures, signs, guards, and the like when no longer required or when directed by the Engineer at the completion of the Work.

11. The Contractor shall dispose of all demolition materials, equipment debris, and all other items not marked or specified by the City or the Engineer to remain as property of the City, off site and in conformance with the requirements of the Contract and all existing applicable laws and regulations.

12. The Contractor shall de-energize and disconnect electrical service to all structures and equipment prior to demolition or relocation. No demolition activity shall commence prior to electrical disconnection.

13. All construction and demolition debris that has come in contact with regulated solid waste shall be cleaned to the satisfaction of the Engineer before leaving the site.

14. The use of explosives is not permitted.

B. Structural Removals

1. The Contractor shall remove concrete, structures and sub-structures to the lines and grades shown unless otherwise directed by the Engineer. The removal of masonry beyond these limits shall be at the Contractor's expense and these excess removals shall be reconstructed to the satisfaction of the Engineer with no additional compensation to the Contractor. Remove masonry and existing concrete by methods that will not excessively remove suitable underlying materials or damage existing concrete to remain.

2. The Contract Drawings show approximate available information on thickness of existing concrete to be removed and the extent of reinforcement. It is the Contractor’s responsibility, before commencing the demolition work, to verify the thickness of existing concrete to be removed and the extent to which it is reinforced by suitable means as deemed necessary by the Contractor in the field. The City does not guarantee the accuracy of existing concrete thickness to be removed or the

extent of reinforcement shown on the Contract Drawings, as actual concrete thickness or reinforcement may vary. No additional compensation will be made because of variations from the thickness of concrete or for variations in the extent of reinforcement shown on the Contract Drawings.

3. All concrete, stone, masonry, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure shall be removed and taken from the site and disposed of at a permitted facility. Demolished items shall not be used in backfill.

4. After removal of parts or all of masonry walls, slabs and like work which tie into new work or existing work, the point of junction shall be neatly repaired so as to leave only finished edges and finished surfaces exposed.

5. When conducting demolition activities on masonry materials (i.e., brick and concrete), the Contractor shall perform work area and personal exposure monitoring in accordance with applicable regulations and standard industrial hygiene methods, until sufficient data is generated to demonstrate compliance with permissible exposure limits for crystalline silica, as calculated according to 29 CFR 1926.55 and 1926.57, employing exposure control methods specified in 29 CFR 1926.1153(c)(1). Compliance with permissible exposure levels must be demonstrated with a minimum of three (3) consecutive readings taken seven (7) days apart, for each new work task or change in equipment, process, or control measure.

C. Mechanical Removals

1. Mechanical removals shall consist of dismantling and removing existing pipes, pumps, motors and other facilities as specified, shown, or required for the completion of the work. It shall include cutting, capping, draining, and plugging as required, except that the cutting of existing piping for the purpose of making connections thereto will be included under Division 40 of the Specifications.

2. Existing process, water, chemical, and other piping shall be removed where shown on the Contract Drawings. All removed piping shall be removed to the nearest solid support, capped and left in place. Piping shall be purged and made safe by the Contractor prior to removal or capping. Disposal of any chemicals or other purged material in accordance with the requirements of Section 01 35 45 - Hazardous Materials Control and other applicable environmental, health, and safety (EHS) requirements of the Contract shall be the responsibility of the Contractor. Where piping that is to be removed passes through existing walls, it shall be cut off and properly capped on each side of the wall.

3. When underground piping is to be altered or removed, the remaining piping shall be properly capped. Abandoned underground piping may be

left in place unless it interferes with new work or is shown or specified to be removed.

4. Provide all caps, plugs, blind flanges, shut-off valves and other work and materials required to remove from service existing piping and necessary to keep existing piping in service where shown or required.

D. Pavement, Curb and Sidewalk Removals:

1. Remove existing pavement, including base and surface courses, stabilized sub-bases, curbs, and gutters as required to construct new facilities or as shown. Before removing, saw a straight joint at least 1-1/2-inches deep between sidewalk and pavement designated for removal and that left in place. Curbs and gutters shall be removed to the nearest construction joint beyond the limit of demolition shown on the Contract Drawings.

2. Provide for satisfactory transition between replaced pavement and sidewalks and the portions remaining in place.

E. Electrical Removals:

1. Electrical removals shall consist of the removal of existing control panels, motors, conduits and wires, and miscellaneous electrical equipment all as shown, specified, or required to perform the work.

2. All existing electrical equipment and fixtures to be removed shall be removed with such care as may be required to prevent unnecessary damage to keep existing systems in operation and maintain the integrity of the grounding systems.

3. Distribution panelboards shall be removed or modified as shown in the Contract Documents. Switchboards to be removed shall be disconnected and dismantled, and all components shall be disposed of off the site. Circuit breakers and other control equipment on modified panelboards that will no longer be used shall be removed unless otherwise shown or specified. All new openings cut into the modified switchboard panels shall be cut square and dressed smooth to the dimensions required for the installation of the new equipment.

4. Motors shall be disconnected and removed where shown or specified. Motors not marked or designated by the City or the Engineer to be salvaged shall be removed from the site. Motors or other electrical equipment designated for reuse shall be stored in enclosed, heated storage.

5. Conduits and wires shall be abandoned or removed where shown. All wires in abandoned conduits shall be removed, salvaged, turned over to the City and stored where directed by the Engineer. Abandoned conduits concealed in floor or ceiling slabs, or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed

from the site. Repair all areas of work to prevent rust spots on exposed surfaces.

6. The Contractor shall coordinate all electrical shutdowns with the Engineer and the facility's Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

F. Miscellaneous Removals:

1. Contractor shall remove miscellaneous items where shown on the Contract Documents or where necessary for the construction of new structures or modification of existing structures. Anchor bolts shall be cut back one inch below the concrete surface and the hole patched.

G. Modifications and Closures:

1. Modifications shall conform to all applicable requirements of the Contract Documents, and the directions and approvals of the Engineer.

2. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. Contractor shall repair such openings with the same or matching materials as the existing floor, wall, or roof, or as otherwise approved by the Engineer. All repairs shall be smoothly finished unless otherwise approved by the Engineer.

3. Openings in existing concrete slabs, ceilings, roofs, masonry walls, floors and partitions which are not to be used in the new work shall be closed and sealed as shown or otherwise directed by the Engineer.

4. Where parts of existing structures are to remain in service, demolish the portions to be removed, repair damage, and leave the structure in proper condition for the intended use. Remove concrete and masonry to the lines designated by drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp straight corners that will result in neat joints with new construction or be satisfactory for the purpose intended. Where existing reinforcing rods are to extend into new construction, remove the concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing flush with the surface.

5. New work shall be keyed into the existing in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, the same or matching materials as the existing adjacent surface shall be used. The finished closure shall be a smooth, tight, sealed, permanent closure with all exposed surfaces smooth finished and acceptable to the Engineer.

H. Maintenance and Clean Up:

1. Contractor shall maintain the buildings, structures, and other City properties free from accumulations of waste, debris, and rubbish caused by the demolition and removal operations.

2. Contractor shall provide on-site dump containers for collection of waste materials, debris and rubbish, and shall wet down dry materials to prevent blowing dust.

3. At reasonable intervals during the progress of the demolition and removal work or as directed by the Engineer, the Contractor shall clean the Site and properties and dispose of all waste materials in accordance with the applicable regulations and requirements of this Contract.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02 68 00 – WORK ON RESERVOIR AND DIVERSION OF WATER
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section provides information on the hydrologic setting of the Project, Contractor coordination, and minimum requirements pertaining to Contractor's control of surface water and operations planning.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	14
1.07	Submittals	14
1.08	Delivery, Storage, and Handling	15
1.09	Spare Parts, Special Tools, and Supplies	15
1.10	Warranty	15
PART 2	PRODUCTS	15
2.01	Manufacturers	15
2.02	Materials / Equipment	15
2.03	Fabrication / Assembling / Finishes	15
2.04	Source Quality Control / Shop Tests	15
PART 3	EXECUTION	16
3.01	Examination / Preparation	16
3.02	INSTALLATION	16
3.03	Field Testing / Quality Control	16
3.04	Startup / Demonstration	16
3.05	Adjusting / Protection / Cleanup	16

C. Under this Contract, work within the reservoir will be required adjacent to the active spillway where water depths exceed 100 feet. There will also be work within the outflow area immediately downstream of the spillway. A general description of each work area as related to the reservoir and water-borne support follows:

1. Work on Active Reservoir: Work on the reservoir will entail watercraft support during three primary tasks: 1) HLRT construction upstream of monolith M18, 2) crest gate removal from the spillway notch at monoliths M15, M16 and M17, and 3) reconstruction of concrete spillway steps within this gated spillway notch. This work is anticipated to be accomplished with substantial barge support utilizing large cranes and with extensive diver assistance. Work on the reservoir must be performed such that Contractor's existing work, equipment, materials, personnel as well as DEP facilities

(Gilboa Dam) are not placed at risk due to rising reservoir levels and spills. The performance of work on the reservoir is subject to weather, spillway flow, reservoir level conditions, and operation requirements. The Contractor is entirely responsible for the work activities performed on the Schoharie Reservoir and is encouraged to perform this work whenever water levels and favorable weather conditions permit.

2. Work within the Spillway Outflow Area: Work within and immediately downstream of the Spillway includes the aforementioned removal of crest gates and infilling of the gated notch with reinforced mass concrete, construction of a temporary work platform downstream of monolith M18 for tunneling through the spillway, spillway tunneling activities, HLRT Pipe installation, tunnel grouting, and spillway access stairway modifications and new construction. Additional work downstream of the spillway includes installation of flow monitoring instrumentation and a steel bar rack at the Plunge Pool End Sill. Contractor shall schedule all work within the Spillway Outflow Area to occur when risk of spillway overflow is negligible or shall provide temporary diversion structures to protect work in progress.

1.02 PAYMENT

A. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

B. Should the Contractor be ordered by the City in writing to suspend/resume operations, then payment for the work associated with this suspension/resumption shall be made at the unit price bid as Contract Reference Item No. UP-1, as described in Specification Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 35 00 – Diving Services

C. Section 01 35 27 – Environmental, Health And Safety Requirements

D. Section 01 42 00 – References

E. Section 02 41 10 – Demolition and Removals

F. Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control

G. Section 46 66 00 – Water Treatment Systems

1.04 REFERENCES

A. U.S. Geologic Survey (USGS) stream gage websites:

1. General Nationwide Data: http://waterdata.usgs.gov/nwis/sw

2. Schoharie Reservoir near Grand Gorge:
http://waterdata.usgs.gov/nwis/uv?site_no=01350100

3. Schoharie Creek at Prattsville, NY:
http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01350000

4. Schoharie Creek at Gilboa, NY:
http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01350101

5. Schoharie Creek near Lexington, NY:
http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01349705

B. National Oceanographic and Atmospheric Administration (NOAA) websites:

1. Advanced Hydrologic Prediction Service ("Schoharie Creek at Gilboa Dam"): https://water.noaa.gov/gauges/giln6

2. Station Locator: https://www.ncdc.noaa.gov/cdo-web/datatools/findstation

3. Precipitation at Prattsville, Gage 306839.

4. Precipitation at Tannersville, Gage 308406.

1.05 DESCRIPTION

A. Note the various vertical datum that have been used at different times in the Project's history, specifically as it relates to the information referenced by the Contract Documents. As indicated on the Contract Drawings, the present vertical datum is consistent with the BWS Datum, and not the North American Datum 1988 (NAVD 88). The vertical benchmarks located on the site, topography, and project features depicted on the Contract Drawings are with respect to the BWS Datum. Using the BWS Datum the spillway crest is at approximate Elev. 1130.0 feet, generally consistent with the original design as shown on the archival drawings, hydrologic data published by the USGS, hydraulic records kept by the City, and hydrologic modeling conducted during Engineer's design. As indicated on Drawing 475-G-002 General Notes, 2. Survey Control, note e., the conversion between BWS Datum and NAVD 88 is:

BWS Datum = NAVD88 + 1.47 feet.

B. The City cannot ensure that water levels can be continuously maintained at an elevation that will not impact the Contractor work area. Contractor requests to lower the pool will not be considered. The only outlets from Schoharie Reservoir other than the Gilboa Dam spillway are the Low Level Outlet (LLO) and the Shandaken Intake and Tunnel System. The LLO is not expected to be operated to control reservoir levels during construction. The intake and tunnel system can be used by the City to divert flows from the Reservoir into the Esopus Creek, but its operation by NYCDEP is solely for water supply purposes, and the capacity of this diversion and release can be less than the natural inflows to Schoharie Reservoir. Whenever this condition occurs, the water level in Schoharie Reservoir rises without further option for control until the level reaches the crest of the gated

spillway notch (Elev. 1125.1+/- feet), which is currently fitted with moveable crest gates that can vary between Elev. 1125.1+/- and 1130.0. If the flow capacity of the gated spillway notch is exceeded, the water level will rise above the original spillway crest (Elev. 1130.0 feet). Reservoir level increases of 2 to 3 feet in one day occur on a regular basis, and rates of 5 to 6 feet per day are not uncommon when the initial water level is at least 2 to 3 feet or 5 to 6 feet, respectively, below the original spillway crest (Elev. 1130.0 feet) when the level increase starts. The maximum daily change in water level observed between 1995 and 2005 was 32 feet. The Contractor shall plan work activities such that the work area can be suitably secured and protected in the event of quickly rising water levels that threaten to adversely impact active work areas.

C. Existing Diversion and Release Capacity:

1. Shandaken Intake: Operation of the Shandaken intake is conducted solely by NYCDEP representatives for water supply purposes and will not be used to regulate reservoir elevations during construction.

2. Low Level Outlet (LLO): A low level outlet conduit, valve chamber, and valve building were installed under construction contract CAT-212C as shown on select reference drawings. The LLO was designed to convey up to 1,500 million gallons per day with the reservoir at normal pool. However, the LLO is not expected to be operated to control reservoir levels during construction.

3. Gated Spillway Notch: The crest gates in the spillway notch were constructed under construction contract CAT-359 (circa 2011) but shall be removed as part of the current Work. The existing crest gates are approximately 221 feet long and project vertically to Elev. 1125.1+/- when fully lowered, making this the existing crest elevation for hydraulic purposes. When the water level is at the notch crest at the start of a spill event, a spill event with an average return period of approximately two years can pass through the notch without overtopping the rest of the spillway. Larger spill events that begin with the water level at the notch crest will exceed the flow capacity of the spillway notch and cause flows to also discharge over the entire spillway crest in monoliths M1 through M17. Refer to Table A in Article 1.07 for additional information in this regard. It is the Contractor's responsibility to remove the moveable crest gates under this Contract. The Contractor shall sequence the spillway notch cofferdam installation early in the Project's schedule, and therefore the spillway notch will not provide diversion capacity during subsequent work. Note that Work of this Contract is required on the spillway notch crest and face and immediately downstream of the notch, as well as in the lower plunge pool and end sill areas, as shown on the Contract Drawings. Consequently, it is anticipated that at least a portion, if not all, of the gated notch's length will be occupied with temporary diversion features to preclude nominal spillway overflows. Restoration of the concrete spillway steps within the gated notch will also provide flow barrier at the notch, thereafter.

4. Two generations of temporary spillway siphon systems that are shown in some reference materials were previously installed in the central portion of the spillway. Both of these systems have been removed and cannot be used to assist with reservoir level regulation.

5. Original Low-Level Outlet: The original low-level outlet located within the base of monolith M18 at the western end of the spillway was decommissioned under construction contract CAT-212B. It cannot be used to assist with reservoir level regulation.

D. Contractor Responsibilities:

1. The Contractor assumes all risk for work activities on the Schoharie Reservoir, regardless of City's option to issue a City-ordered Suspension / Resumption of Operations, which is described in Attachment 1.

2. Flood Protection: Establish and submit for approval plans related to Diversion of Water Management as required by this specification Section that are commensurate with the stipulated level(s) of protection. The Contractor agrees with and commits to enact the following provisions:

   a. If, at any time during the Contractor's operations, weather conditions occur that might reasonably be expected to cause flooding that would endanger the integrity of the Work under this Contract, take all reasonable precautions to protect partial or completed permanent work from damage, and perform all other Work associated with the Contractor's operations as may be required by the City in the event of an anticipated flood.

   b. Undertake this work in a timely manner.

   c. Accept responsibility for all such precautionary measures and all work necessary to reestablish construction activities afterward with no additional cost to the City for flood events at or less than the stipulated level of protection.

3. Flood Damage: Rainfall events will likely occur that result in runoff in excess of some temporary diversion works and release capacities. Damage to partially completed work could result from flooding of the Contractor's work area if such a storm event occurs during critical stages of construction. The Contractor shall perform all Work necessary to repair damage to partial and completed Work including pumping floodwaters from work areas and all cleanup.

4. Prior to performing the Work, the Contractor shall submit for approval and implement (if approved) a site-specific Environmental Health and Safety Plan (EHASP) in accordance with the provisions of all local, state and federal regulations including NYCDEP, NYSDEC and USEPA as described by the provisions of the Environment Health and Safety (EHS)

requirements as stipulated in Section 01 35 27 – Environmental, Health and Safety Requirements.

5. Comply with all the provisions of Section 01 35 00 – Diving Services including, but not limited to, submitting a Diving Operations Manual and a Dive Plan, which shall depict the Contractor's general plan for accomplishing the diving operations.

6. All construction activities that are not specifically designated in the Contract Documents to be performed underwater shall be performed in the dry. Furnish and install or construct temporary diversion facilities, cofferdams, channels, sumps, and pumping facilities as required so that all construction activities that are not specifically designated in the Contract Documents to be done underwater will be performed in the dry. Responsibility includes responding to flood conditions and maintaining and removing any temporary features and channels installed for surface flow diversion as needed for construction.

7. The Contractor is wholly responsible for designing and maintaining their own localized diversion facilities, protecting the work area from flooding, and restoring the site following any flooding that may occur up to the minimum stipulated level(s) of protection identified in the Contract Documents. Approval of a Diversion of Water Plan by the Engineer will not relieve the Contractor from full responsibility for the adequacy of the diversion and protective works or for furnishing all equipment, labor and materials, and performing all operations in connection with the diversion of flows during construction; nor shall such approval be construed as obligating the City for any loss or damage resulting from the diversion operations.

8. The Contract Drawings include temporary cofferdam features associated with construction of the HLRT that have been designed by the Engineer. This cofferdam is intended to serve the dual purpose of providing the outer formwork for the HLRT walls. The Contractor will be responsible for providing shop drawings for this cofferdam, which should detail suitable adaptations to accommodate the Contractor's means and methods for enacting concrete formwork during construction of the HLRT walls. No changes to the structural member design shall be made without first obtaining Engineer's express written approval.

9. Inspect on-site diversion and release facilities installed under this Contract daily and immediately after each significant rainfall event. For the purposes of this Contract, significant rainfall events shall include, at a minimum, those that cause overtopping of any temporary diversion features, wetting due to storm flow of a temporary diversion feature for which the usual service condition is dry, or any in which observed or suspected erosion damage has occurred to site features.

10. Assume responsibility for clearing accumulated debris from all diversion and release facilities to maintain their unobstructed flow. Remove debris within the gated spillway notch, spillway crest, the plunge pool end sill and its surroundings, and any other Contractor work area, as soon as practical, as may be necessary to safely and effectively perform Work.

E. The Work includes significant underwater work and work on the face of the dam immediately above the reservoir, including material placements and drilling and washing drill holes with water that, unless controlled, could contaminate water bodies. Include, implement, and maintain provisions to control, convey, settle, and dispose of wash water from these operations as part of the Diversion of Water Plan to fully prevent contamination of the Schoharie Reservoir and the Schoharie Creek in accordance with all applicable specifications, the Contract Drawings, and all applicable Federal, State, New York City and local laws. Additional requirements are included in Section 46 66 00 – Water Treatment System.

F. The Contract Drawings and cofferdams contain suggested physical diversion of water concepts for consideration by the Contractor. The Contractor's own Diversion of Water Plan may contain alternative concepts from those depicted herein, provided that such proposal retains all permanent features of the work as required by the Contract Documents. Concepts suggested by the Engineer for physically implementing the diversion are not intended to restrict Contractor's creativity in approaching the work.

G. Diversion of Water Requirements: The sequence of installing temporary diversion of water features shall be incorporated into, and coordinated with, the Contractor's overall sequence of work in a manner to minimize risk of flood damage and consequential disruption to the project schedule. Accordingly:

1. For work on and within the HLRT and the tunnel through the dam, a reservoir pool level of Elev. 1140.0 feet represents the stipulated level of protection below which the Contractor fully accepts risks of flood damage to the Work. This corresponds to a water surface elevation with approximately a 100-year average return period. A minimum height of temporary cofferdam at the HLRT is not explicitly specified. However, the Engineer's design of the temporary cofferdam, as shown on the Contract Drawings, will require installation in incremental segments of fixed height. The Contractor may establish an interim top of cofferdam elevation commensurate with their own level of risk tolerance, provided the Contractor's design of the modified cofferdam is provided to the Engineer for review and approval of its consistency with unaltered project features. All joints used in the HLRT cofferdam installation shall be watertight. All work within the protection area of the HLRT cofferdam shall be performed in the dry.

2. For Work on and downstream of the spillway, a reservoir pool level of Elev. 1132.0 feet represents the stipulated level of protection below which the Contractor fully accepts risks of flood damages to the Work. Spillway discharges commensurate with this reservoir elevation will vary depending

upon the construction phase and the Contractor's selected sequence of operations.

3. Physical features or diversion methods that in any way draw the reservoir pool below Elev. 1124.5 feet could negatively impact the City's water supply and shall not be permitted unless specifically approved by the City.

4. No obstruction of the existing spillway crest that cannot be readily removed in advance of anticipated spillway flow shall be allowed between Sta. 3+06D (at the East Training Wall) and Sta. 13+50D (within monolith M14). Equipment or materials that are temporarily staged in this area shall be promptly removed in advance of any anticipated spillway overtopping (i.e., reservoir level exceeding approximately Elev. 1130.0 feet).

5. The Contractor is encouraged to perform downstream work in the plunge pool and End Sill area whenever water level and favorable weather conditions permit. Extension of the Contract duration due to inclement weather or adverse flow conditions that hinders this Work will not be granted by the City.

6. Additional limitations on construction sequencing that relate to the Diversion of Water are contained in Section 01 14 00 – Work Restrictions and Section 02 24 10 – Demolition and Removals.

7. The required level of protection and corresponding diversion feature construction criteria are presented in the Contract Documents. With the exception of the temporary cofferdam/formwork that surrounds the HLRT, the means and methods required to construct the temporary diversion features remain the Contractor's responsibility. The Contractor shall include in their Diversion of Water Plan the intended sequence of construction of diversion features in relation to other required work, and the construction details of the diversion features, including the method for incorporating their footprint into the permanent work, if necessary. Without intending to limit the Contractor's alternatives, diversion features that might be considered by the Contractor include steel strongbacks with lagging, portable or ballasted barriers, shallow sandbag and/or "Super-sack" barriers, and dimensional lumber framing. Temporary bracing may be required, and a mixture of diversion methods may be appropriate to satisfy Contractor's requirements in different areas of work. Contractor's design of the temporary diversion features shall include a minimum overdesign factor (safety factor) of 1.3 applied to anticipated loadings, above-and-beyond minimum design code requirements, to mitigate the risk of cofferdam failure during events that exceed the stipulated level of protection.

8. Contractor shall notify the City a minimum of 60 days in advance of the installation of the temporary cofferdam at the gated spillway notch.

H. Historical and Estimated Streamflows:

1. Information about meteorological setting, historical streamflow, and water elevations for various "events" at the stream gages and at the dam are included in this Section solely for the convenience of the Contractor, and possible use in evaluating flood risk and potential impacts to the work schedule. The Contractor shall be fully responsible for assessment, interpretation, and verification of any information contained in this Section. Conclusions or interpretations based on data attached herein are solely the responsibility of the Contractor. No guarantee of accuracy of these data or analyses is given or implied by the City.

2. The Project is located on Schoharie Creek just upstream from the Town of Gilboa, NY. The drainage area of Schoharie Creek at the dam site is 314.4 square miles.

3. Available Stream Data: The USGS records and publishes real-time reservoir levels and streamflow statistics based on recording stations located at the City's Shandaken Intake building (reservoir level only), downstream at the Town of Gilboa, and upstream of the reservoir at the Town of Prattsville. Forecasting products developed by the National Weather service are publicly available. The Contractor shall utilize these products as their primary means of reservoir forecasting and major storm prediction impacts. Real-time provisional streamflow data is available on the Internet at the addresses listed in Article 1.01.

4. Estimated peak discharges at the project site for spill events with select recurrence intervals are presented in Table A below. Flows corresponding to various average recurrence intervals were estimated based on hydrologic computer modeling of flood flows through the reservoir with spillway notch in place in monoliths M15–M17 (with gates lowered) and the original crest elevation elsewhere. These estimates are approximate due to the highly variable nature of the many factors that influence actual peak streamflow and respective average recurrence interval for any given spill event.

TABLE A
Hydrological Data at Project Site
(with Spillway Notch Crest Gates Lowered)

Average Recurrence Interval	24-hour Rainfall Depth (inches)	Estimated Peak Outflow (cfs[1])	Estimated Peak Pool Elev. (feet[2])	Depth of Flow over Notch / M1-M14 Crest (feet)
2-year	3.3	7,700	1130.1	5.0 / 0
5-year	4.5	21,700	1131.9	6.8 / 1.8
10-year	5.3	32,300	1132.8	7.7 / 2.7
25-year	6.3	48,400	1134.0	8.9 / 3.9
50-year	7.0	61,400	1134.9	9.8 / 4.8
100-year	7.5	70,200	1135.5	10.4 / 5.4

[1] cfs = cubic feet per second
[2] Elevation datum is BWS Datum

5. Table B provides daily average streamflow in Schoharie Creek as measured at the Prattsville recording station (drainage area: 237 square miles), based on USGS published records (1902 through 2025).

TABLE B
Schoharie Creek at Prattsville Average Daily Flow by Month

Month	Average Daily Streamflow
Jan	494 cfs
Feb	449 cfs
Mar	869 cfs
Apr	1,080 cfs
May	584 cfs
Jun	312 cfs

Month	Average Daily Streamflow
Jul	174 Jul
Aug	159 Aug
Sep	210 Sep
Oct	351 Oct
Nov	493 Nov
Dec	570 Dec

6. Historical reservoir level data that has been provided in Section 01 42 00 – References, are summarized on Table C-1 and Table C-2 below.

TABLE C-1
Calculated Spill Frequency for Select Threshold Flow Levels
Based on 73-year, Daily Recordings

	# of Times in 73-Year Period that Spill Exceeded Threshold [1,2,3]				
Month	**1,000 cfs**	**2,000 cfs**	**4,000 cfs**	**8,000 cfs**	**16,000 cfs**
Jan	36	22	11	3	1
Feb	30	25	10	3	1
Mar	74	51	27	9	2
Apr	101	85	42	15	0
May	78	53	24	5	1
Jun	28	17	7	4	0
Jul	12	9	3	0	0
Aug	5	4	2	1	0
Sep	14	11	5	3	1
Oct	17	18	8	5	3
Nov	21	20	15	4	1
Dec	35	28	13	4	1

TABLE C-2
Calculated Spill Frequency for Select Threshold Flow Levels
Based on ~13-year, 15-Minute Recordings

	# of Times in ~13-Year Period that Spill Exceeded Threshold[2,3,4]				
Month	**1,000 cfs**	**2,000 cfs**	**4,000 cfs**	**8,000 cfs**	**16,000 cfs**
Jan	7	7	6	3	2
Feb	7	4	1	1	0
Mar	16	13	7	2	0
Apr	15	22	13	5	0
May	8	9	4	1	0
Jun	7	7	3	2	2
Jul	3	2	2	1	1
Aug	3	2	0	0	0
Sep	11	10	5	3	2
Oct	6	8	3	2	1
Nov	7	8	7	4	2
Dec	9	12	5	4	2

[1] Based on combined and culled data; 1927 through 2005, "average daily" data taken from USGS gage no. 01350100, and once-per-day reservoir elevations contained in NYCDEP logs.
[2] Flow rates estimated by (based on Gilboa Dam Physical Model Study):
Q (in cfs) = ((Reservoir Elevation - 1130) / 0.00519732)(1/0.64343952)
[3] Represents the count of spill events that exceeded the given thresholds. A single spill exceedance can occur over multiple days but is counted only in the month that the exceedance began. For example, if a spill started in March, exceeded 1,000 cfs and 2,000 cfs in March, and exceeded 4,000 cfs for 3 days beginning in April, and the spill stopped in May, it would be counted as 1 spill exceedance event in

March for 1,000 cfs and also for 2,000 cfs, and 1 spill exceedance event in April for the 4,000 cfs threshold. Another example would be a spill beginning in March that peaked at 1,100 cfs and returned to 500 cfs for a few days, and then surged back to 1,300 cfs before stopping in March, would be counted as two exceedances for the 1,000 cfs threshold.

[4] Based on April 23, 1992 through February 17, 2005 daily maximums, extracted from USGS gage no. 01350100, 15-minute data.

TABLE D
Historical Spill Event Summary by Threshold Discharges

	All Spills	Threshold Spillway Discharges (cfs)						
		500	1,000	1,500	2,000	4,000	8,000	16,000
# of events (~73 years of data)[1]	222	442	451	398	343	167	56	11
# of events (~13 years of data)[2]	62	96	99	105	104	56	28	12
Average # of spill events per year over period of record	3.0	6.1	6.2	5.5	4.7	2.3	0.8	0.2
Average # of spill events per year over period of record	4.8	7.4	7.6	8.1	8.0	4.3	2.2	0.9
Average duration of spill that exceeds threshold (days)	33.7	10.5	6.0	4.2	3.3	2.3	1.3	1.0
Average duration of spill that exceeds threshold (days)	30.7	12.0	7.4	4.8	3.3	2.1	1.6	1.2
Median duration of spill that exceeds threshold (days)	17	5	3	2	2	1	1	1
Median duration of spill that exceeds threshold (days)	18	5	4	3	3	2	2	1
Average of daily discharges during threshold exceedance	–	1,267	2,012	2,781	3,554	6,630	11,861	18,574
Average of daily 15-minute discharge averages	–	1,628	2,616	3,521	4,499	8,577	14,791	22,232

[1] Unshaded rows are based on daily data with ~73-year period of record. See footnote 1 of Table C.
[2] Shaded rows are based on 15-minute data with ~13-year period of record. See footnote 4 of Table C.
Footnotes 2 and 3 of Table C also apply to the data of Table D.

7. Table E provides estimates of instantaneous peak flow in Schoharie Creek at the Gilboa recording station (drainage area: 316 square miles), based on USGS published records (since 1902), for the range of recurrence intervals presented following USGS Bulletin 17B guidelines of the Interagency Advisory Committee on Water Data. The peak flows presented in Table E and Table A differ for the respective recurrence interval due to differences in hydrologic approaches.

TABLE E
USGS 01350101 Schoharie Creek at Gilboa NY
(Gage Located On Left Bank at Downstream Side of 990V Bridge)

Return Period	Peak Flow (cfs)
1-yr	5,064
2-yr	15,050
5-yr	30,190
10-yr	43,170
25-yr	62,950
50-yr	81,710
100-yr	99,350
1/2 PMF	120,800
200-yr	123,880
500-yr	152,900
PMF	312,220

I. Protection of Work:

1. Flood Protection: The Contractor shall establish a Diversion of Water Management Plan commensurate with the level(s) of protection described in Article 1.04. The Contractor shall:

   a. Accommodate diversion and release operations and conduct the work in a manner that will prevent blockage of any diversion and release works.

   b. Provide the City with a telephone number at which Contractor may be contacted at all times during the construction period.

   c. If, at any time during the Contractor's operations, weather conditions occur that might reasonably be expected to cause flooding that would endanger the integrity of the work under this Contract, take all reasonable precautions to protect partial or completed permanent work from damage, and perform all other work associated with the Contractor's operations as may be required by the City in the event of an anticipated flood.

   d. Accept responsibility for all such precautionary measures that may be required in the event of an anticipated flood and any and all work necessary to reestablish construction activities subsequent thereto with no additional cost to the City for flood events at or less than the stipulated level of protection.

2. Flood Damage: Rainfall events will likely occur that result in runoff in excess of the diversion works and release capacities. Damage to partially completed Work could result from flooding of the Contractor's work area if such a storm event occurred during critical stages of construction. The Contractor shall perform all work necessary to repair damage to partial and

completed Work including pumping floodwaters from work areas and all cleanup.

1.06 QUALITY ASSURANCE

A. The Contractor's design for all diversion facilities shall be prepared by a Professional Engineer who is registered in the State of New York and who has had at least five years of experience and technical and practical knowledge in the hydrologic and hydraulic design of stream diversion systems. The Contractor will be solely responsible for the adequacy of their diversion facilities and coordination with other work.

1.07 SUBMITTALS

A. Reservoir Work Plan: Submit a proposed Reservoir Work Plan within 90 calendar days after the date of Notice to Proceed. No work on the reservoir will be permitted until the Reservoir Work Plan has been submitted, reviewed, approved, and distributed. The Reservoir Work Plan shall incorporate (at least by reference) the approved Diving Operations Manual and Dive Plan submittals required under Section 01 35 00 – Diving Services.

B. Diversion of Water Plan: Submit a proposed Diversion of Water Plan to the Engineer for approval within 90 calendar days after the date of the Notice to Proceed. No work in or adjacent to Schoharie Reservoir and the spillway channel area will be permitted until the Diversion of Water Plan has been submitted, reviewed, approved, and distributed. At a minimum, submit the following data:

1. Qualifications of the Contractor's Professional Engineer responsible for designing all diversion facilities.

2. General and detailed calculations, drawings, and specifications prepared by, and bearing the seal of, the Contractor’s Professional Engineer, including those for any temporary cofferdams, walls, bulkheads or diversion channels. Any supplemental design criteria that is relied upon during development of the Contractor’s design of diversion facilities shall also be elucidated.

3. Erosion and sediment control features associated with diversion works.

4. Clearances provided between the permanent work and any diversion works.

5. Schedule showing the proposed time, sequence and duration of operation of Contractor-selected diversion features.

6. Means and methods for abandonment of the proposed temporary features without damaging permanent work.

7. Telephone number at which the Contractor may be contacted at all times during the construction period.

8. All other data necessary to portray a clear understanding of the proposed Diversion of Water Plan.

C. Flow Diversion Operations Plan: Submit a proposed Flow Diversion Operations Plan within 14 calendar days after the date of Notice to Proceed. No work within the spillway or other onsite areas that could be impacted by flooding will be permitted until the plan has been submitted, reviewed, approved, and distributed. Requirements of the plan are included in Attachment 1 to this Section.

D. Winter Shutdown Plan(s): Submit a narrative that describes the Contractor's plans for spillway maintenance and protection of partially completed work during the forthcoming anticipated winter shutdown period. The Plan shall describe the Contractor's intentions for relocating materials and equipment from all parts of the spillway and downstream channel, where winter work is not planned, and their plan for securing partially completed work. The Winter Shutdown Plan should be submitted by November 1 of each year and be specific to that year's work in progress.

E. Plan Revisions: As Work progresses and as actual site conditions warrant, revise the Reservoir Work Plan, Diversion of Water Plan and Flow Diversion Operations Plan so that each continues to satisfy the applicable provisions of the Contract Documents during all phases of work. Submit plan revisions to the Engineer within 14 calendar days of any change in conditions that warrants a Plan update. The Contractor shall be responsible for assessing evolving site conditions and maintaining consistency between their actual operations and the approved Plans.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall construct task-specific diversion facilities with sufficient clearances to perform the required Work.

B. The Contractor shall implement erosion control measures, as specified in Specification Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control, during excavation work associated with construction and removal of water diversion facilities. Provide additional measures to control or divert local (i.e., on-site) runoff in accordance with the requirements of Specification Section 31 25 10.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. The Contractor shall remove all temporary diversion features after they have served their purpose. Exercise care during the removal of all diversion features to minimize turbidity in the reservoir and the adjacent stream channels; exercise care during removal of diversion features to prevent injury to the permanent work; and repair or replace to the satisfaction of the City any damage occasioned thereby, all at no additional cost to the City.

END OF SECTION

Attachment 1

Flow Diversion Operations Plan Requirements

Work under this contract will be required within an active waterway (spillway and stream channel). Except for normal diversions through the Shandaken Tunnel via the STIC by DEP for water supply purposes and operation of the existing spillway crest gates, there is no available method for regulating the level of the reservoir and therefore flows through the spillway. The Low Level Outlet (LLO) is expected to be put into operation by the time of this Contract's issuance. However, the LLO will not be used to regulate reservoir elevations during construction. During some years, there are periods of time (primarily during the summer months) when the reservoir drops well below the spillway crest. Depictions of this by month (for average conditions) are shown on the Contract Drawings. Accordingly the Contractor's work, personnel, equipment and materials will potentially be at risk of flooding depending on the phase of the project as well as weather, flow, and reservoir level conditions. The Contractor shall therefore prepare a plan and narrative that describes each phase of the flow diversion including (1) specific work areas that could be impacted (impact areas) in the event that the discharge capacity of the temporary diversion and release works is exceeded, (2) individuals responsible for implementing the plan, (3) description of conditions that constitute each plan Response Level, (4) procedures for notifying the DEP and Construction Management representatives, and (5) schedule for completing work in the various diversion phases. Specific details required in the "Flow Diversion Operations Plan" are described below.

1. A plan and narrative that describes each phase of the flow diversion including identification of specific work areas that could be impacted (impact areas) in the event that the discharge capacity of the temporary diversion and release works is exceeded. The plan shall describe the duration of work in each area and the time of year (specific dates) when the work will start and stop.

2. A plan for continuously monitoring the weather, flow, and reservoir level. The Contractor's attention is directed to the National Weather Service website: https://water.noaa.gov/gauges/giln6

   This website provides current reservoir levels and daily predictions of the Schoharie Reservoir level in response to anticipated weather conditions. Further description of the data and NOAA's forecasting is presented within the website.

3. A plan for each diversion phase for demobilizing personnel, equipment and materials from impact areas and securing partially completed work in the event of a reservoir level rise that is predicted or reasonably anticipated to exceed the capacity of the diversion system. At a minimum, the plan shall include and define the criteria and accompanying actions for the following flood Response Levels:

   - **Flood Watch Level:** Routine monitoring of the reservoir level, spillway flow, and weather conditions.
   - **Flood Warning Level:** Initial identification of conditions that could result in spillway flows that exceed the capacity of the diversion system. As a

minimum, the warning shall be triggered whenever there is flow over the spillway or predicted to occur within 48 hours.

- **Flood Demobilization Initialization:** Weather, flow, and/or reservoir level conditions corresponding to initiation of demobilization activities from potential impact areas. As a minimum, City-ordered Suspension/Resumption of Operations in all areas protected by the diversion works (impacted areas) shall be initiated whenever there is a reasonable expectation or prediction that flow will exceed the minimum stipulated level of protection for the spillway notch.
- **Flood Demobilization Complete:** Weather, flow, and/or reservoir conditions corresponding to complete demobilization of personnel, equipment, and materials from the impact areas and securing completed work that could be impacted by flood flows.
- **Post-Flood Remobilization:** Weather, flow, and/or reservoir conditions that trigger remobilization of personnel, equipment and materials to the impact area.

4. The Contractor is advised that the reservoir level fluctuates dramatically in response to rainfall and/or snowmelt conditions and that rises of up to 32 feet in a single day have occurred in the past. The Contractor shall consider this when developing the operations plan Response Levels described above.

5. At a minimum, the following information shall be provided for each response level:

    - Development and maintenance of a weather condition, flow, and reservoir level recording log (Diversion Conditions Log) whenever the pool is above (or as soon as it is predicted to exceed) the stipulated top of cofferdam at the spillway notch, Elev. 1132.0. The log shall include, as a minimum, current precipitation conditions, ambient temperature, predicted precipitation conditions for next 48-hour period, current reservoir level, change in reservoir level during the preceding 24 and 48 hours, and rate of reservoir change in feet during the preceding 24 and 48 hours. The log shall be provided to the City's Construction Manager (CM) and DEP on a weekly basis during the Flood Watch Level and on a daily basis during all other Response Levels.
    - Name and contact information for the individuals that will be responsible for monitoring reservoir, spillway flow, and weather conditions during all work shifts, nights, weekend, and holidays. The log shall also identify the current diversion phase, summary of work taking place, and current response level.
    - Name and contact for Contractor's supervisors who will be responsible for reviewing the Diversion Conditions Log in the event that the response level changes from "Flood Watch" to "Flood Warning." A primary contact person and two secondary contacts must be available at all times, including weekends, nights, and holidays, when active work is occurring in a potential impact area. Active work, for the purpose of this Plan, is defined as "ongoing or partially completed work within the HLRT/tunnel, spillway, or plunge pool areas and periods of time when materials and/or equipment are stored in these areas." In the event that a "Flood Warning Level" is triggered, the supervisor

shall be responsible for reviewing weather, flow, and reservoir conditions on an hourly basis. As soon as this response level is declared, the Contractor shall also notify the CM and DEP representatives. Contacts for CM and DEP representatives, including backup contacts, shall be provided.

- Communications flow chart for each flood response level.
- Trigger points that result in a change from one response level to the next response level. The Contractor shall consider their anticipated activities in each diversion phase when setting trigger levels, including extent of personnel, equipment and materials within the potential impact area and relative timing required for demobilization. Trigger levels may be based on current reservoir level, rate of reservoir rise, predicted reservoir levels, predicted or current flow rates, predicted or current precipitation, or a combination of these factors.
- Communication flow chart and procedures for notifying the Contractor's entire work force of demobilization from potential impact areas and procedures for barricading access to impact areas once demobilization has occurred.

6. A summary of procedures to be implemented in the event that equipment and materials are not demobilized in advance of a diversion overtopping event. The summary shall describe procedures for recovering equipment and materials from the site or downstream channel and plans for subsequent cleanup. Names and contact information shall be provided for any environmental response and/or cleanup subcontractors that would be used in the event of an environmental spill.
7. A summary of the Contractor's awareness program for educating their workforce on the hazards associated with working in or near an active waterway.
8. Procedures for inspecting and maintaining the diversion facilities on a routine basis and following flood events.

– END OF ATTACHMENT –

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting Asbestos-Containing Materials (ACM), trace asbestos materials (i.e., Building Materials containing 1% or less of asbestos), and Asbestos-Containing Waste Materials, specified herein, or required to complete the Work. ACM was not identified. The Contractor shall conduct a visual inventory of all work areas. If suspect materials are encountered, the Contractor shall sample to confirm if ACM or non-ACM.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions; minimize the quantity of waste generated; protect the health and safety of all personnel and welfare of the public; and avoid adverse environmental impacts.

C. It should be noted that DEP Asbestos Projects being conducted on New York City property that is physically located outside of the five boroughs, would be subject to the requirements of 12 NYCRR 56, and not the requirements of RCNY Title 15, Chapter 1.

D. In the absence of analytical testing results for certain materials, the material shall be classified as suspect ACM pending the analytical results. Abatement of unforeseen or suspect/confirmed asbestos during the Work performed under this Section shall be in accordance with Section 01 35 45 – Hazardous Materials Control.

E. All Independent Third-Party air monitoring shall be outside this Contract and performed by others.

F. The Contractor shall label all known ACM in the field to prevent accidental disturbance by workers.

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	3
1.04	References	3
1.05	Description	12
1.06	Quality Assurance	12
1.07	Submittals	14
1.08	Delivery, Storage, and Handling	21
1.09	Spare Parts, Special Tools, and Supplies	21
1.10	Warranty	21
PART 2	PRODUCTS	21
2.01	Manufacturers	21
2.02	Materials / Equipment	21

2.03 Fabrication / Assembling / Finishes 22
2.04 Source Quality Control / Shop Tests 22
PART 3 EXECUTION.....22
3.01 Examination / Preparation 22
3.02 Implementation 23
3.03 Field Testing / Quality Control 24
3.04 Startup / Demonstration 25
3.05 Adjusting / Protection / Cleanup.....25

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s), or allowance(s) as set forth in Section 01 27 00 – Measurements and Payments.

B. At the completion of abatement activities, the Contractor is responsible for submitting all of the documentation required herein. Payment to abate and dispose of ACM and resulting Asbestos-Containing Waste Materials produced by this Work will not be made until all required documentation, including the following is provided to the City:

1. Copies of all NYSDOL and DEP Asbestos Control Program (ACP)-approved Asbestos Project notifications, work permits, Variances, Work Place Safety Plans, and any applicable documentation filed or received from the NYSDOL and DEP ACP, including Notices of Violations (NOV).
2. Copies of the Asbestos Abatement Contractor's Handling license.
3. Copies of DEP and NYSDOL Asbestos Handler Supervisor and Asbestos Handler certificates, where applicable, for all workers engaged in the project.
4. A copy of the Asbestos Abatement Contractor's daily Isolation Barrier book (bound notebook). Copies of laboratory reports and Chain-of-Custody (COC) documents for Worker Exposure Monitoring conducted by the Asbestos Abatement Contractor, including the name, address, and New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) registration number of the laboratory used for air sample analysis (10 NYCRR 55-2).
5. All data related to bulk sampling, including the results of any asbestos surveys performed by a DEP-certified Asbestos Investigator and NYSDOL-certified Asbestos Inspector, where applicable.
6. The Asbestos Work Plan submitted and implemented in accordance with the requirements of this Section.
7. The total quantity of ACM abated.
8. The start and completion dates of the Asbestos Project(s).

9. A signed copy of the manifest(s) from the asbestos-permitted landfill with complete COC documentation, certifying the amount of asbestos waste delivered.

10. The name and address of the asbestos waste transporter.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 01 41 00 – Regulatory Requirements

D. Section 01 51 11 – Temporary Water and Sanitary Services

E. Section 01 51 12 – Temporary Heat and Ventilation

F. Section 01 51 30 – Temporary Electrical System

1.04 REFERENCES

A. Definitions

1. Abatement: Any and all procedures physically taken to control fiber releases from ACM. This includes Removal, Encapsulation, enclosure, cleanup, and Repair.

2. Adequately Wet: Defined by the EPA (40 CFR 61.141) as a material sufficiently mixed or penetrated with amended water to prevent the release of Visible Emissions. If Visible Emissions are observed coming from an ACM or asbestos waste, then the material has not been "Adequately Wetted." However, the absence of Visible Emissions is not evidence of being Adequately Wet. ACM must be fully penetrated with the wetting agent to be Adequately Wet. If the ACM being abated is resistant to amended water penetration, the wetting agent shall be applied to the material prior to and during Abatement as necessary to minimize the potential for fiber releases.

3. Aggressive Air Sampling: A method of sampling within a Negative Pressurized Enclosure (NPE) in which mechanical equipment is used before and during the sampling period to stir up settled dust/asbestos fibers. Mechanical equipment includes 20-inch fans and forced air equipment (e.g., a one-horsepower leaf blower).

4. Air Sampling Technician: A person who performs Asbestos Project air sampling and possesses a valid Air Sampling Technician certificate issued by the NYSDOL.

5. Ambient Air Monitoring: The measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the Work site, performed in accordance with NIOSH or EPA sampling methodologies.

6. Asbestos Abatement Contractor: A Subcontractor licensed by the NYSDOL who performs Abatement during an Asbestos Project, or employs persons performing such Abatement.

7. Asbestos Abatement Permit: A permit issued by the DEP ACP in accordance with RCNY Title 15, Chapter 1, authorizing the performance of construction Work for Asbestos Projects involving any of the activities defined in RCNY Title 15, Chapter 1-26(a) (1)-(13).

8. Asbestos Assessment Report (Form ACP-5): A form submitted to the DEP ACP by which a DEP-certified Asbestos Investigator certifies that a building or structure (or portion thereof) is free of ACM or the amount of ACM to be abated constitutes a Minor Asbestos Project.

9. ACM: Any material containing greater than one percent asbestos.

10. Asbestos Handler: An individual certified by the DEP and/or NYSDOL who disturbs, removes, encapsulates, repairs, or encloses ACM. Asbestos Handlers working on projects within the five boroughs shall possess both DEP and NYSDOL certifications. Asbestos Handlers working on projects outside of the five boroughs shall possess NYSDOL certifications.

11. Asbestos Handler Supervisor: An individual certified by the DEP and/or NYSDOL who supervises the asbestos handlers during an Asbestos Project, and ensures that proper asbestos Abatement procedures as well as individual safety procedures are being adhered to. Asbestos Handler Supervisors working on projects within the five boroughs shall possess both DEP and NYSDOL certifications. Asbestos Handler Supervisors working on projects outside of the five boroughs shall possess NYSDOL certifications.

12. Asbestos Project: Any Work performed in connection with the alteration, renovation, modification, or demolition of a building or structure, or in connection with the replacement or repair of equipment, pipes, or electrical equipment not located in a building or structure, which will involve the Abatement, Disturbance, or cleanup of friable or Non-Friable Asbestos. Asbestos Projects are classified as either Large Asbestos Projects, Small Asbestos Projects, or Minor Asbestos Projects in New York State and New York City, and each type of project involves several phases, which can include: background air monitoring, mobilization, pre-abatement/Containment construction, Abatement, cleaning/re-cleaning, final Clearance Air Monitoring, Containment breakdown, and demobilization.

13. Asbestos Project Notification (Form ACP-7): A form submitted to the DEP ACP for all Large Asbestos Projects and Small Asbestos Projects. Minor Asbestos Projects do not require an ACP-7 form.

14. Asbestos-Containing Waste Material: ACM or asbestos-contaminated objects requiring disposal.

15. Building Materials: Any and all materials listed in 12 NYCRR 56-5.1(f)(1), including but not limited to interior and exterior finished, equipment,

plaster, roofing, flooring, caulking, sealants, tiles, insulation, and mortar and refractory bricks used in the construction of boilers.

16. Clean Room: An uncontaminated area or room that is part of the Personal Decontamination Enclosure System, with provisions for the storage and changing of "street clothes" into clean Personal Protective Equipment (PPE).

17. Clearance Air Monitoring: Area air monitoring performed inside the Restricted Area and Regulated Abatement Work Area after the completion of the final cleaning, final waiting period, and Final Visual Inspection by the Asbestos Handler Supervisor and Project Monitor. Aggressive Air Sampling shall be performed as part of the Clearance Air Monitoring activities inside of the Containment.

18. Containment: The NPE within the Restricted Area, which establishes the Regulated Abatement Work Area, and surrounds the location where the asbestos Abatement is actually taking place.

19. Critical Barrier: A term used by the NYSDOL to define barriers that seal-off all openings to or within the defined Regulated Abatement Work Area, including but not limited to operable windows, skylights, doorways, ducts, grills, diffusers, and any other penetrations to surfaces adjacent to or within the Regulated Abatement Work Area.

20. Disturbance: Any activities that disrupt the matrix of ACM, or Asbestos-Containing Waste Materials. This includes activities that generate dust, debris, Visible Emissions, or airborne asbestos fibers, including moving friable ACM or Asbestos-Containing Waste Materials from one place to another.

21. Encapsulation: The coating or spraying of ACM, or the bare substrate surface that is exposed after an Abatement, with a pigmented (i.e., non-transparent) liquid sealant that creates a membrane over the surface of the material (bridging encapsulant) or penetrates into the material and binds its components together (penetrating encapsulant).

22. Excursion Limit: Defined in the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) as individual exposure, without regard to the use of respirators, to an airborne concentration of asbestos fibers of 1.0 fiber per cubic centimeter of air (1.0 f/cc) averaged over a 30-minute sampling period. No employee of the Contractor shall at any time be exposed to concentrations of asbestos fibers above the Excursion Limit.

23. Worker Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee, for the purpose of determining compliance with OSHA's Asbestos Standard for the Construction Industry (29 CFR 1926.1101). Analytical results from Worker Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a Restricted Area and Regulated

Asbestos Work Area. For the purpose of this Section, Worker Exposure Monitoring samples shall be collected from individuals who are representative of each task being conducted by the Contractor, and all Worker Exposure Monitoring shall follow pertinent NIOSH or EPA sampling methodologies.

24. Final Visual Inspection: An inspection performed by the Project Monitor and Asbestos Handler Supervisor at the completion of the final waiting period on an Asbestos Project (but prior to Clearance Air Monitoring). The inspection is performed in accordance with ASTM E1368 to determine the completeness of Abatement and cleanup.

25. Friable Asbestos: A term used by the NYSDOL to define any ACM or asbestos waste that can be crumbled, pulverized or reduced to powder when dry, by hand pressure.

26. Glovebag: A manufactured, impervious, bag-like enclosure with two (2) inward-projecting long sleeve gloves, one (2) inward-projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The Glovebag is constructed and installed to surround an object or area to be abated, and contain all asbestos fibers released during the Abatement process.

27. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and Negative Air Pressure Equipment (i.e., Microtraps) used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

28. Holding Area: A room or area in the Waste Decontamination Enclosure System utilized for the temporary (i.e., no longer than the current work shift) storage of containerized asbestos waste, prior to its transfer to a final on-site storage container (i.e., dumpster, trailer, or roll-off) or a licensed asbestos waste transport vehicle. The Holding Area is located between the washroom and an uncontaminated area.

29. Independent Third-Party Monitor: A NYSDOL-licensed asbestos contractor who will be contracted by the Engineer or the City, and is completely independent of the Asbestos Abatement Contractor involved with the Asbestos Project. The Independent Third-Party who conducts ambient and clearance air monitoring or Project Monitoring on an Asbestos Project shall not have any business, personal, or other relationship with the Asbestos Abatement Contractor.

30. Isolation Barrier: A term used to define the construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the Regulated Abatement Work Area from surrounding areas and contain asbestos fibers.

31. Large Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of 260 linear feet or more of ACM, or 160 square feet or more of ACM.

32. Log: An official record, maintained by the Asbestos Abatement Contractor, of all activities that occurred during the Asbestos Project. The Log shall be in the form of a bound notebook, and at a minimum, identify the following information: (a) the building owner, agent, contractor, and workers; (b) daily activities, cleanings, and waste transfers; (c) the names and certificate numbers of all Asbestos Handlers and Asbestos Handler Supervisors; (d) the results of inspections of decontamination systems, barriers, and negative pressure ventilation equipment; (e) summaries of all corrective actions and Repairs; (f) work stoppages with reasons for stoppages; (g) manometer readings at least twice per work shift; (h) daily checks of emergency and fire exits; (i) any unusual events.

33. Microtrap: (See definition of "Negative Air Pressure Equipment").

34. Minor Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of 25 linear feet or less of ACM, or 10 square feet or less of ACM.

35. Negative Air Pressure Equipment: A local exhaust system capable of maintaining air pressure within the Containment at a lower pressure than the air outside of the Containment. The Negative Air Pressure Equipment also provides for the HEPA filtration of all air exhausted from the Containment.

36. Non-Friable Asbestos: A term used by the NYSDOL to define any ACM or asbestos waste that cannot be crumbled, pulverized or reduced to powder when dry, by hand pressure.

37. Obstruction: The blocking of a means of egress with any temporary structure or barrier. Polyethylene sheeting shall not be considered an Obstruction when it is prominently marked with exit signage or paint, and cutting tools (i.e., a knife or razor blade) are attached to the work area side of the sheeting for use in the event that the sheeting must be cut to permit egress. A corridor shall not be considered obstructed when there is a clear path measuring at least three feet wide.

38. OSHA Monitoring: (See definition of "Worker Exposure Monitoring").

39. P-100 Filter: (See definition of: "HEPA").

40. Perimeter Monitoring: (See definition of "Area Monitoring").

41. Permissible Exposure Limit (PEL): Defined in the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) as individual exposure, without regard to the use of respirators, to an airborne concentration of asbestos fibers of 0.1 fibers per cubic centimeter of air (f/cc) calculated as an 8-hour Time-Weighted Average (TWA). No

employee of the Contractor shall at any time be exposed to concentrations of asbestos fibers above the PEL. See also Excursion Limit.

42. Personal Decontamination Enclosure System: A series of connected rooms designed to control the passage of Asbestos Handlers, and other authorized individuals into the Regulated Abatement Work Area from uncontaminated areas. The system consists of a Clean Room, a Shower Room, and an equipment room separated from each other and the Regulated Abatement Work Area by airlocks and curtained doorways.

43. Personal Monitoring: (See definition of "Worker Exposure Monitoring").

44. Phase Contrast Microscopy (PCM): An analytical method (e.g., NIOSH 7400 and 7401) used for determining the asbestos fiber concentration in an air sample.

45. Polarized Light Microscopy (PLM): An analytical method (e.g., 40 CFR 763, Subpart F, Appendix A or ELAP Item 198.1 or 198.6) used for determining the asbestos content in a bulk material.

46. Post Abatement Air Monitoring: (See definition of "Clearance Air Monitoring").

47. Presumed Asbestos-Containing Material (PACM): Material suspected of containing asbestos as described in 15 RCNY 1-38. PACM is considered to be ACM unless proven otherwise by appropriate bulk sampling and laboratory analysis.

48. Project Designer: A person who performs Asbestos Project design functions and possesses a valid Project Designer certificate issued by the NYSDOL.

49. Project Monitor: A person who performs Asbestos Project Monitoring functions and possesses a valid Project Monitor certificate issued by the NYSDOL

50. Regulated Abatement Work Area: The portion of the Restricted Area where Abatement Work actually occurs. This includes the interior of the Restricted Area Containment enclosure. For Glovebag operations, the areas contiguous to where the operation takes place are Regulated Abatement Work Areas. For tents, the interior of each tent is a Regulated Abatement Work Area. For exterior, Non-Friable Asbestos Abatement conducted without the establishment of negative air ventilation systems or Containment enclosures, the entire Restricted Area surrounding the Abatement location is considered to be the Regulated Abatement Work Area.

51. Removal: The stripping of any ACM from surfaces or components of a building or structure.

52. Repair: A term used by the DEP to define a corrective action using specified work practices (e.g., Glovebags or tents) to minimize potential asbestos fiber releases from minimally damaged ACM.

53. Restricted Area: An area established and marked for the Abatement portion of an Asbestos Project. The area shall include, but not be limited to, Regulated Abatement Work Areas and any contiguous decontamination enclosure systems, adjoining staging areas where work materials, debris, or waste materials from such Work may accumulate, and waste storage areas (e.g., dumpsters, trailers, or roll-offs).

54. Shower Room: A room between the Clean Room and the equipment room in the Personal Decontamination Enclosure System set up to prevent cross-contamination by ensuring the removal of potential asbestos contamination from the body that may have accumulated during Abatement operations. The Shower Room shall have hot and cold running water controllable at the tap, shall be arranged for complete showering during decontamination, and shall include clean, dry towels, soap, and shampoo in quantities sufficient to accommodate the personnel working on the Asbestos Project.

55. Small Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of more than 25 linear feet but less than 260 linear feet of ACM, or more than 10 square feet but less than 160 square feet of ACM.

56. Suspect ACM: All friable and non-friable materials suspected of containing asbestos as determined by a certified NYSDOL Asbestos Inspector and/or certified DEP Asbestos Investigator, which have not been sampled and analyzed for asbestos content. Suspect ACM includes PACM.

57. Tent: (See definition of “Containment”).

58. Transmission Electron Microscopy (TEM): An analytical method (e.g., 40 CFR 763, Subpart F, Appendix A or ELAP Item 198.4) used for determining the asbestos fiber concentration in an air sample, or for determining the asbestos content in a bulk material.

59. Trace Asbestos-Containing Material: A building material that contains less than or equal to 1% of asbestos.

60. Variance: Relief from specific requirements set forth in state or local asbestos regulations, which is granted in writing by the agency that enforces the regulations.

61. Visible Emission: Any emission containing particulate material that can be seen without the aid of instruments.

62. Waste Decontamination Enclosure System: A series of connected rooms designed to control the transfer of materials and equipment from the Regulated Abatement Work Area. The system consists of a washroom and a Holding Area separated from each other and the Regulated Abatement Work Area by airlocks and curtained doorways.

63. Wet Cleaning: The process of eliminating asbestos contamination from surfaces, equipment, or other objects by using cloths, mops, or other cleaning tools that have been saturated with amended water.

64. Worker Decontamination Enclosure System: (See definition of "Personal Decontamination Enclosure System").

65. Work Place Safety Plan: Construction documents prepared by a registered design professional and submitted for review to the DEP ACP in order to obtain an Asbestos Abatement Permit. The plan shall include, but not be limited to, plans, sections, and details of the Regulated Abatement Work Area clearly showing the extent, sequence, and means and methods by which the Work is to be performed.

B. Reference Standards:

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding ACM, trace asbestos materials, and Asbestos-Containing Waste Materials. These regulations, standards, and guidelines include, but are not limited to the following:

a. ASTM International:

1) D2898 – Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing;

2) E84 – Standard Test Method for Surface Burning Characteristics of Building Materials;

3) E1368 – Standard Practice for Visual Inspection of Asbestos Abatement Projects.

b. United States (U.S.) Department of Transportation (DOT):

1) 49 CFR 171 - General Information, Regulations, and Definitions;

2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response information, and Training Requirements;

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packagings;

4) 49 CFR 178 – Specifications for Packagings.

2. United States Environmental Protection Agency (EPA):

a. 40 CFR 61 - National Emission Standards for Hazardous Air Pollutants (NESHAP);

b. 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste;

c. 40 CFR 268 – Land Disposal Restrictions;

d. 40 CFR 302 – Designation, Reportable Quantities, and Notification;

e. 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA).

3. National Institute for Occupational Safety and Health (NIOSH):
   a. Method 7400 – Asbestos and Other Fibers by PCM;
   b. Method 7401 – Asbestos by TEM.
4. National Fire Protection Association (NFPA):
   a. NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials;
   b. NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
5. New York City Department of Environmental Protection (DEP):
   a. Environmental Health and Safety Policies and Procedures – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;
   b. Environmental Health and Safety Policies and Procedures – Vol. III, Asbestos Management;
   c. RCNY Title 15 Chapter 1 - Asbestos Control Program Rules and Regulations; RCNY Title 15 Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.
6. New York City Department of Sanitation (DSNY):
   a. RCNY Title 16 Chapter 8 – Asbestos Rules and Regulations.
7. New York State Department of Environmental Conservation (NYSDEC):
   a. 6 NYCRR 360 - Solid Waste Management Facilities;
   b. 6 NYCRR 364 - Waste Transporter Permits;
   c. 6 NYCRR 376 – Land Disposal Restrictions.
8. New York State Department of Health (NYSDOH):
   a. 10 NYCRR 55-2 – Approval of Laboratories Performing Environmental Analysis.
9. New York State Department of Labor (NYSDOL):
   a. 12 NYCRR 56 - Asbestos Rules and Regulations.
10. Occupational Safety and Health Administration (OSHA):
   a. 29 CFR 1910 – Occupational Safety and Health Standards;
   b. 29 CFR 1910.28 – Safety Requirements for Scaffolding;
   c. 29 CFR 1926.65 – Hazardous Waste Operations and Emergency Response;
   d. 29 CFR 1910.134 - Respiratory Protection Standard;

e. 29 CFR 1910.1001 - Asbestos Standard for General Industry;

f. 29 CFR 1910.1200 - Hazard Communication Standard;

g. 29 CFR 1926 - Safety and Health Regulations for Construction;

h. 29 CFR 1926.1101 - Asbestos Standard for the Construction Industry.

11. Underwriters Laboratories, Inc. (UL):

a. UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units;

b. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

1.05 DESCRIPTION

A. Commencement of Work: Ten (10) business days prior to the proposed start of Work at each separate location, the Contractor shall notify the Engineer, the onsite safety staff, and building occupants. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed Asbestos Project), and provide them estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify Other Contractors in advance of the abatement Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. The Contractor shall ensure that Personal and Waste Decontamination Enclosure Systems along with the Regulated Abatement Work Area are constructed of solid materials with lockable doors to prevent unauthorized entry during non-working hours.

E. Meetings: In addition to the pre-construction meeting and site walk-through, other meetings may be required or may be requested by the Engineer, including briefings with Site Operations personnel. Written documentation (i.e., “minutes”) of all meetings shall be generated by the Contractor, and copies shall be provided to DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Permits and Notifications: The Contractor shall make all necessary notifications, secure any necessary permits and Variances, complete agency-required forms, and pay all fees in conjunction with asbestos Abatement activities, waste transportation, and waste disposal in accordance with federal, state, and local asbestos regulations (as per 01 41 00 - Regulatory Requirements). Prior to the submittal of any

notifications, permit/Variance applications, or forms to regulatory agencies, the Contractor shall provide them to the Engineer for review.

B. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

C. Compliance: In addition to the requirements of this Section, DEP Environmental Health and Safety (EHS) Policies and Procedures and Section 01 35 27 – Environmental Health and Safety Requirements, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the Abatement, disturbance, cleanup, handling, transportation, storage, and disposal of ACM, trace asbestos materials, and Asbestos-Containing Waste Materials. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, and federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

D. Rejection of Non-Complying Items: DEP reserves the right to reject Contractor submittal items, including proposed disposal facility, vendors, subcontractors or personnel with regulatory citations/violations, that it deems inappropriate or unacceptable by the Engineer or DEP. The DEP further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Contract amount, as approved by the DEP.

E. Suspect Material Characterization: All caulking and bitumastic coatings are considered suspect ACM. Therefore, if a confirmatory sample will be collected, the sampling shall be performed by a certified DEP Asbestos Investigator or NYSDOL Asbestos Inspector.

F. Qualifications:

1. Asbestos Abatement Contractor: The Contractor shall possess a current NYSDOL asbestos license and shall have successfully completed at least two (2) Asbestos Projects of comparable scope and methodologies within the past three (3) years. This experience shall be documented and provided as follows: (a) the name, address, and phone number of each facility where the work was performed; (b) the volume and type of each material that was abated; (c) the specific methods of Abatement (including the tools, technologies, and engineering controls employed);

2. Asbestos Handler Supervisor:

   a. Shall be currently certified by the DEP (if working on Asbestos Projects in the five boroughs) and NYSDOL (for all Asbestos Projects).

   b. Shall have a minimum of two (2) years of experience on Asbestos Projects, and shall have served as the Asbestos Handler Supervisor on at least three (3) Asbestos Projects of comparable scope and methodologies to the work being performed under this Section.

3. Asbestos Handler:

   a. Shall be currently certified by the DEP (if working on Asbestos Projects in the five boroughs) and NYSDOL (for all Asbestos Projects), and

   b. Shall have a minimum of one (1) year of experience on Asbestos Projects, and shall have worked on at least three (3) Asbestos Projects of comparable scope and methodologies to the Work being performed under this Section.

1.07 SUBMITTALS

A. Thirty (30) business days prior to commencement of the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. Asbestos Inspection and Sampling Plan: The Contractor shall provide an Asbestos Inspection and Sampling Plan to identify suspect asbestos-containing materials and collect confirmatory samples, as appropriate during the inspection.

2. The Asbestos Inspection and Sampling Plan shall include at a minimum:

   a. At a minimum, the inspection shall be performed by a certified NYSDOL Asbestos Inspector, who shall have OSHA 10-hour certification, and confined space entry training as applicable to the location or work, and shall have performed similar inspection work on at least three (3) projects of comparable scope.

   b. Credentials of the laboratory providing sample analysis. The credentials shall include current certification by the NYSDOH ELAP.

   c. Sample collection, analysis and reporting protocol in accordance with 12 NYCRR Part 56.

   d. Health and safety protocol (Job Hazard Analysis) for all investigation activities.

3. Asbestos Inspection Report: The Contractor shall provide an Asbestos Inspection Report summarizing the results of all inspection activities, and as applicable, a sampling narrative, laboratory data packages and an inventory, including photographs, of all identified suspect and confirmed asbestos-containing materials. All reporting shall be in accordance with 12 NYCRR Part 56.

4. Asbestos Work Plan: The Asbestos Work Plan shall be prepared in accordance with 12 NYCRR 56, all applicable DEP EHS Policies and Procedures, and all other pertinent federal, state, and local regulations. In addition, the Asbestos Work Plan shall be coordinated with the Engineer. The Asbestos Work Plan shall also be signed and dated by a NYSDOL-certified Project Designer, with a copy of the Project Designer's current

NYSDOL certification, attached to the Work Plan. The Asbestos Work Plan shall include the following elements:

a. Asbestos Control:

1) Drawings showing the location and details of the following: (a) each Regulated Asbestos Work Area; (b) the type, location, and number of negative air pressure machines that will be used, as well as all exhaust locations; (c) proposed electrical hookups and temporary electrical panels; (d) proposed water hookups; (e) each Restricted Area; (f) each Personal Decontamination Enclosure System; (g) each Waste Decontamination Enclosure System; (h) each waste storage area (e.g., dumpster, trailer, or roll-off); (i) restroom areas; (j) areas designated for eating and drinking.

2) A section on the interfacing of trades (i.e., other contractors) and the sequencing of asbestos-related Work.

3) A section on the collection, handling procedures, cleanup, and disposal of Asbestos-Containing Waste Materials (including the collection, filtering, and disposal of wastewater).

4) A section on the procedures and methodologies that will be used to conduct Worker Exposure Monitoring, including the name and qualifications (i.e., training and experience documentation) of the individual who will be responsible for conducting the Worker Exposure Monitoring.

5) A section on housekeeping procedures to be used for maintaining clean Regulated Abatement Work Areas, clean Restricted Areas, and clean decontamination enclosure systems.

6) A section on the specific methods and procedures that will be used to control fiber releases, and ensure that as per 40 CFR Part 763, Subpart E, of the EPA Asbestos in Schools Rule measured by Phase Contrast Microscopy (PCM), fiber concentrations less than or equal to the clearance and action criteria of 0.01 f/cc of air, or background levels (whichever are greater), are not exceeded outside of each Regulated Abatement Work Area. For projects conducted outside of the five boroughs of New York City, the clearance and action criteria is less than 0.01 f/cc; of air, or background levels (whichever is greater).

7) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) the types of

ACM that will be disturbed, or Asbestos-Containing Waste Materials that may be generated when performing the activity; (d) the engineering controls that will be used to control the spread of asbestos fibers during the activity; (e) the proposed crew size for the activity and individual employee responsibilities during the activity; (f) housekeeping procedures that will be used during the activity; (g) PPE and proposed respiratory protection that will be used for the activity.

8) Equipment and Supplies: Identify the materials and equipment that will be used to perform the Work, including materials and equipment designed to be non-combustible or fire retardant in accordance with NFPA 701 and 255. Materials and equipment utilized for Abatement activities that take place within the five boroughs, shall conform to RCNY Title 15 Chapter 1-61.

9) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment, and shall develop and submit an equipment decontamination plan to the Engineer for review and approval prior to the start of Work.

10) Safety Data Sheets (SDSs): Provide SDSs for all chemical products (including wetting agents and encapsulants) to be used for the Work.

b. Waste Management:

1) A description of the types of ACM and Asbestos-Containing Waste Materials associated with the Work (include details regarding whether the materials are friable or non-friable) as per 49 CFR 171 and 172.

2) The estimated quantity of each waste stream that will be generated as per 40 CFR 302.

3) Name, address, telephone number and current permit documentation for the disposal facility indicating that the facility is approved by federal, state, and local regulatory agencies to receive Asbestos-Containing Waste Materials.

4) Current 6 NYCRR 364 and 49 CFR 173 permit documentation for the waste transporter that will transport Asbestos-Containing Waste Materials from the Work Site to the disposal facility.

5) Spill prevention, Containment, and cleanup contingency measures to be implemented during a suspected fiber release or emergency situation.

6) A detailed discussion of the on-site handling, storage, removal, cleanup, and disposal of waste materials, including the following: (a) description of the waste storage areas; (b) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (c) the types of bags/containers; (d) the submittal of weekly waste inspection records.

7) The name and qualifications of the Asbestos Handler Supervisor. At a minimum, the Asbestos Handler Supervisor shall be onsite during all activities affecting ACM.

c. Asbestos Abatement Project Notifications and Permits: Submit completed permits and notifications to the Engineer for review and approval prior to submittal to the applicable agencies. All Large Asbestos Projects and Small Asbestos Projects that take place within the five boroughs are required to follow notification and permitting procedures per RCNY Title 15, Chapter 1. All Large Asbestos Projects require notification procedures per 12 NYCRR 56. Documents that may be required based upon the scope and location of the project include, but are not limited to, the following:

1) EPA Large Asbestos Project Notification;

2) DEP Asbestos Assessment Report (Form ACP-5);

3) DEP Asbestos Project Notification (Form ACP-7);

4) DEP Asbestos Project Amendment (Form ACP-8);

5) DEP Asbestos Variance Application (Form ACP-9);

6) DEP Asbestos Technical Review Unit Permit (A-TRU Permit);

7) DEP Work Place Safety Plan;

8) NYSDOL Asbestos Project Notification; and

9) NYSDOL Asbestos Variance Application.

d. A detailed schedule for the implementation of the Asbestos Work Plan elements, including the different phases of the Asbestos Project, the projected start and completion dates for Restricted Area preparation, gross Removal and Abatement, cleanings, Clearance Air Monitoring, and demobilization activities.

e. Medical Surveillance: The Contractor shall provide a sufficient number of properly trained, experienced, and certified workers, each of whom shall: (a) have received a medical exam that included a Pulmonary Function Test (PFT) within the past year; (b) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (c) have received a

qualitative or quantitative respirator fit-test within the past year for the specific respirator the employee will be using for this Work.

f. Employee Documentation: The Contractor shall provide a sufficient number of properly trained, experienced, and certified workers, each of whom shall: (a) have current NYSDOL-issued and DEP-issued asbestos certificates; (b) documentation for Asbestos Handlers and Asbestos Handler Supervisors, including required work experience; and (c) dates and written proof of respiratory clearance, including fit-test and medical examinations by the Contractor or other employer within the past year.

g. A current (i.e., within the last month) signed and notarized statement disclosing all of the Abatement Contractor's OSHA, EPA, NYSDOL, DEP, DSNY, and DOT citations/violations on Asbestos Projects within the past three (3) years.

h. A current (i.e., within the last month) signed and notarized statement disclosing all of the Asbestos Handler Supervisor's NYSDOL and DEP citations/violations within the past three (3) years.

i. Analytical Laboratory Qualifications for Analyzing Air Samples: Submit the name, address, and telephone number of each analytical laboratory, including copies of current AIHA and ELAP certificates along with dates of accreditation/reaccreditation. ELAP certificates should show evidence of certification for the specific analytical methods that will be used.

5. The Contractor shall submit all Worker Exposure Monitoring results to the DEP no later than 24-hours after the collection of the air samples.

B. Field Reports and Recordkeeping: The Contractor shall maintain and provide the following documentation:

1. Worker Exposure Monitoring Documentation: Worker Exposure Monitoring Documentation shall be made available to the DEP immediately upon request. All laboratory analytical results shall be accompanied by complete COC documentation.

a. The signed Worker Exposure Monitoring documentation shall include, but not be limited to, the following information: (a) sample "start" and "stop" times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) names of individuals being sampled along with the specific Work task each individual is performing; (e) specific respiratory protection and PPE worn by each individual; (f) types (i.e., makes and models) of sampling equipment used; (g) types of sample media (i.e., filters and cassettes) used; (h) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (i) name of the individual who conducted the Worker Exposure Monitoring; (j) dates that the Worker Exposure Monitoring was

conducted; (k) Work tasks being performed adjacent to the Restricted Area during the Worker Exposure Monitoring; (l) unique sample numbers used to identify each sample; (m) the phase of the Asbestos Project being performed (i.e., background, pre-abatement, Abatement, cleaning, or clearance).

2. Waste Manifest Documentation: A Waste Profile for all asbestos waste shall be completed and submitted to the Engineer for review and approval prior to DEP signature. The Contractor shall submit a Facility Letter of Acceptance form the selected asbestos-permitted landfill stating that the facility will accept the asbestos wastes generated during abatement. The Contractor shall also submit advance copies of the completed manifest for the Engineer's review and approval, prior to NYCDEP signature on the date of disposal. Following disposal, completed and signed waste manifests from the approved, asbestos-permitted landfill, shall be provided to the DEP within 10 business days of disposal. In addition, on-site waste storage areas shall be inspected weekly by the Asbestos Handler Supervisor.

3. Waste Storage Area Inspection Documentation: Each weekly waste storage area inspection shall be documented in the Asbestos Abatement Contractor's bound Log. The Log shall be signed by the Asbestos Handler Supervisor, and shall be made available to the DEP immediately upon request. The content of this documentation shall include, but not be limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type and quantity; (d) the current disposal status (i.e., when the waste container is scheduled to be removed from the Work Site) and physical condition of each waste container; (e) the present condition of each waste storage area; (f) proper label type; (g) storage area security method to prevent unauthorized entry.

4. Asbestos Project Inspection Documentation: Project Monitors and Restricted Areas shall be inspected daily by the Asbestos Handler Supervisor.

   a. Each daily Asbestos Project inspection shall be documented in the Asbestos Abatement Contractor's bound Log. The Log shall be signed by the Asbestos Handler Supervisor, and shall be made available to the DEP immediately upon request. The content of the Log shall include, but is not limited to, the following information: (a) the type of Asbestos Project (i.e., Large Asbestos Project, Small Asbestos Project, or Minor Asbestos Project) being conducted; (b) the current phase of the Asbestos Project (i.e., mobilization, background pre-Abatement, abatement, cleaning, Clearance Air Monitoring, or Containment breakdown); (c) the names of the Asbestos Handlers, Asbestos Handler Supervisors, Project Monitors, and Air Sampling Technicians on site, as well as the name of the company each individual is representing; (d) the types of air monitoring (i.e., Worker Exposure Monitoring or area monitoring) being conducted, and the number of samples being collected for

each type of air monitoring activity; (e) the results of decontamination enclosure system, Critical Barrier, Isolation Barrier, and Negative Air Pressure Equipment inspections; (f) a summary of corrective actions and Repairs; (g) reasons for Work stoppages, if any; (h) manometer readings (at least twice per work shift); (i) emergency and fire exit checks; (j) verification that functional fire extinguishers are present in the Restricted Areas; (k) any unusual events that occurred during the Work; (l) non-compliance issues observed, including their corrective actions.

5. Contractor Project Record: The Asbestos Handler Supervisor shall maintain a project record in the Regulated Abatement Work Area. The Contractor Project Record shall be made available to the Engineer or DEP for review at any time during the Asbestos Project, and shall be submitted to the DEP within 24- hours after the completion of the Asbestos Project.

   a. At a minimum, the Contractor Project Record shall contain the following information: (a) copies of DEP and NYSDOL asbestos certificates/licenses for all individuals/companies working on the Asbestos Project; (b) copies of all notifications, amendments, permits, work safety plans, and Variances related to the Asbestos Project; (c) copies of all exposure and Ambient Air Monitoring results generated during the Asbestos Project; (d) documentation of all pressure differential readings for Regulated Abatement Work Areas; (e) copies of all available bulk sample analytical data as well as asbestos survey reports relating to the Asbestos Project; (f) copies of all daily sign-in sheets as defined in this Article; (g) a list of emergency phone numbers, including the local fire department, local police department, nearest hospital, as well as phone numbers for the Engineer and DEP personnel responsible for administering the Asbestos Project; (h) a copy of New York City's Asbestos Control Program Rules and Regulations (Title 15, Chapter 1); (i) a copy of New York State's Asbestos Rules and Regulations (12 NYCRR 56); (j) a copy of EPA's asbestos regulations (40 CFR 61, Subparts A and M); (k) copies of all SDSs pertaining to all chemicals being used during the Asbestos Project; (l) a copy of the Contractor's Asbestos Work Plan; (m) copies of all daily air monitoring reports as defined in this Article; (n) copies of all daily Asbestos Project inspection reports as defined in this Article; (o) copies of all weekly waste storage area inspection reports as defined in this Article.

6. Daily Sign-In Documentation: The Contractor shall generate daily sign-in documentation for all individuals entering and exiting each Regulated Abatement Work Area and Restricted Area, for the duration of the Asbestos Project. The daily sign-in documentation shall be maintained in the Asbestos Abatement Contractor's bound Log. The daily sign-in

documentation shall be made available to the Engineer or DEP for review at any time during the Asbestos Project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by NIOSH for use in Regulated Abatement Work Areas where the Abatement or Disturbance of ACM or Asbestos-Containing Waste Materials will occur. If not included within the EHASP the Contractor shall submit their Respiratory Protection Program to DEP for review prior to abatement activities. At a minimum, the Contractor shall provide each individual within a Regulated Abatement Work Area with a half-face, negative pressure, air purifying respirator equipped with HEPA filter cartridges. The Contractor's Asbestos Handler Supervisor shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) and the Contractor's Asbestos Work Plan. At no time during the Asbestos Project shall respiratory protection within a Regulated Abatement Work Area be downgraded to below the minimum requirement of a half-face, negative pressure, air purifying respirator equipped with HEPA filter cartridges.

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to asbestos with appropriate PPE.

C. HEPA Filters: HEPA filters used in vacuuming equipment and Negative Air Pressure Equipment must meet or exceed any manufacturer's specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Containment Materials: Plastic sheeting used in the construction of temporary enclosures shall be fire retardant in accordance with NFPA 701. Wood or other materials used in the construction of temporary enclosures shall be non-combustible or fire-retardant in accordance with NFPA 255, ASTM D2898, ASTM E84 and UL 723.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Safe Work Practices for Trace Asbestos materials

1. An exposure assessment shall be performed in accordance with 29 CFR 1926.1101(f) (2) (i) to determine if workers disturbing, handling, or performing cleanup activities involving trace asbestos materials, must wear PPE or respiratory protection.

2. Wetting agents or special work methods shall be utilized to control potential employee exposures to asbestos during the handling, mixing, removing, cutting, application, or cleanup, of trace asbestos materials, except if the use of these wetting agents/work methods is not feasible (e.g., using them may create electrical hazards or equipment malfunctions).

3. Asbestos-contaminated wastes and debris shall be cleaned-up promptly and disposed of in leak-tight containers. The handling, disposal, and transport of Trace Asbestos-Containing Material wastes is not regulated since the wastes are not ACM (i.e., they do not contain greater than 1% asbestos).

4. The use of high-speed abrasive saws that are not equipped with “point-of-cut” ventilators or enclosures with HEPA-filtered exhaust air shall be prohibited.

5. The use of compressed air to cleanup or remove trace asbestos materials is prohibited.

B. Preparation

1. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 - Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the Asbestos Control Area as per 01 51 30 - Temporary Electrical System. All temporary lighting and temporary electrical service to an Asbestos Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

2. Signs: The Contractor shall post conspicuous warning signs at all approaches to Regulated Abatement Work Areas, Restricted Areas, and

waste storage areas. The signs shall be located at such a distance so that personnel may read the sign and take necessary precautions before entering a Regulated Abatement Work Area, Restricted Area, or waste storage area. Signs shall comply with the requirements of federal, state, and local regulations. Once Clearance Air Monitoring results indicate that a Regulated Abatement Work Area is in compliance with the provisions for re-occupancy set forth in RCNY Title 15, Chapter 1 or 12 NYCRR 56, the signs shall be removed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

DANGER
ASBESTOS CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA
NO SMOKING

C. Fire Extinguishers: The Contractor shall maintain at least two functional fire extinguishers in each Restricted Area. The fire extinguishers shall have a minimum rating of 2-A:10-B:C, and each fire extinguisher shall be checked daily by the Asbestos Handler Supervisor to ensure that it remains functional throughout the duration of the Asbestos Project.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the Abatement or Disturbance of ACM or Asbestos-Containing Waste Materials, must be conducted without damage to, or contamination of equipment or surfaces within the Regulated Abatement Work Areas, Restricted Areas, or other areas adjacent to these areas. All such damage or contamination shall be immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Containments and Negative Air Pressure Equipment: Pressure differential readings for each workday shall be obtained, documented in the Contractor's Project Record, and reviewed by the Asbestos Handler Supervisor on a daily basis. The Asbestos Handler Supervisor shall notify the Engineer and the DEP immediately, if any variations in the pressure differential readings may have led to the migration of asbestos fibers outside of a Regulated Abatement Work Area. Corrective actions shall be implemented immediately to ensure that negative pressure is restored.

3. Personal Decontamination Enclosure System: The Contractor shall ensure that employees do not leave a Regulated Abatement Work Area wearing any potentially contaminated protective work clothing or PPE. Employees

are required to shower prior to leaving the Regulated Abatement Work Area.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Air monitoring for airborne concentrations of asbestos fibers shall be conducted by the Asbestos Handler Supervisor (or by a qualified air monitoring firm) in accordance with OSHA.

a. Worker Exposure Monitoring: Worker Exposure Monitoring shall be conducted during each phase of the Asbestos Project (e.g., pre-abatement, Abatement, and cleanup) for one (1) Work shift from at least one (1) employee that is representative of each type of Work task that is being performed. Each personal air sample will "run" for the employee's entire Work shift in order to ensure that enough volume (of air) is collected and an accurate 8-hour TWA can be calculated. Representative 30-minute short-term employee exposures shall also be conducted and shall be determined on the basis of one or more samples representing 30-minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each Regulated Abatement Work Area as per OSHA 1926.1101(f)(1)(iii). Documentation regarding the sample numbers, specific shift when the sampling was conducted, the Work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

b. Complete documentation of all Worker Exposure Monitoring activities shall be in accordance with this Article.

c. The Contractor shall submit all Worker Exposure Monitoring results to the DEP within 24- hours from when the air samples were collected.

d. If at any time, PCM analysis of any air sample (i.e., from Worker Exposure Monitoring performed by the Contractor) in any phase of the Asbestos Project (i.e., pre-abatement, Abatement, cleanup, or clearance) indicates that the filter was "overloaded" and a fiber count cannot be obtained, the sample shall immediately undergo TEM analysis. All costs of the additional TEM analysis will be at the Contractor's expense.

2. Area Monitoring: Air monitoring for airborne concentrations of asbestos fibers shall be conducted by the DEP.

a. All Clearance Air Monitoring results shall meet or be below background ambient air levels or 0.01 f/cc of air (whichever is greater), prior to the breakdown of the Containment. If Clearance Air Monitoring results indicate a fiber count greater than

background ambient air levels or 0.01 f/cc of air in any area, the Contractor will be required to re-clean that area. For projects conducted outside of the five boroughs, the clearance and action criteria is less than 0.01 f/cc; of air, or background levels (whichever is greater). Repeated cycles of cleaning and Clearance Air Monitoring will be performed until a fiber count is achieved that meets or is below background ambient air levels or 0.01 f/cc of air within the area. All costs of re-cleaning and additional Clearance Air Monitoring will be at the Contractor's expense.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: All cleaning Work shall progress from the point most remote from the intakes of the Negative Air Pressure Equipment, towards the intakes of the equipment, as well as from the highest point of the surfaces to be cleaned towards the lowest point of the surfaces. Dry sweeping and using compressed air to cleanup a Regulated Abatement Work Area or a Restricted Area is strictly prohibited. HEPA-filtered vacuums and Wet Cleaning methods shall be used to ensure that these areas remain free of visible dust and debris on a daily basis. In addition, only cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the materials or as approved by the DEP, shall be used.

B. Collection, Filtration and Containerization of Wastes: The Contractor shall collect and containerize asbestos waste (solid and liquid), debris, PPE, and Containment materials on a daily basis in accordance with the Asbestos Work Plan. Using chutes to move construction debris or waste (bagged or not bagged) will not be permitted at any time.

1. Prior to containerizing Asbestos-Containing Waste Materials, the wastes shall be “Adequately Wetted,” and wrapped in 6-mil (0.006”) polyethylene sheeting, or double-bagged in 6-mil polyethylene bags. The bags shall be “goose necked” and sealed air tight with duct tape, and each bag (or wrapped item) shall be labeled before being placed in an appropriate container (i.e., dumpster, trailer, or roll-off) for disposal.

2. Corrugated cartons or drums may be used in conjunction with polyethylene bags and sheeting for the disposal of Asbestos-Containing Waste Materials that have sharp-edged components (e.g., nails, screws, or tin sheeting) which may tear the bags or sheeting. The waste within these drums or cartons must be wrapped or double-bagged, and the cartons/drums must be labeled.

3. Wastewater derived from the Asbestos Project shall be collected and filtered through a system with at least a 5.0-micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid the rapid clogging of the filtration

system by large particles. Contaminated filters shall be disposed of as asbestos waste. Filtered wastewater shall be discharged in accordance with all applicable federal, state, and local regulations.

a. Discharging filtered asbestos decontamination water to a DEP Wastewater Treatment Plant (WWTP) will require written permission from the DEP Bureau of Wastewater Treatment (BWT) and the submission of analytical testing results for asbestos to the BWT for review and approval prior to discharge. The disposal requirements for filtered asbestos decontamination water generated on other DEP properties (e.g., drinking water shafts) may be more stringent or prohibited.

C. Storage of Wastes: The Contractor shall store all bagged Asbestos-Containing Waste Materials in DOT-approved container systems (e.g., a roll-off or trailer), as per 49 CFR 178. No container shall be filled in excess of the capacity marked on the container, and all containers shall be lined with 6-mil (0.006") polyethylene sheeting, have a hard top, and shall be lockable. In addition, all containers shall have an intact and legible label affixed to it. No bagged asbestos waste shall be stored in a Regulated Abatement Work Area or decontamination enclosure system for longer than the current Work shift that generated the waste.

1. Non-Asbestos Waste: The Contractor shall store non-Asbestos-Containing Waste Materials separately from Asbestos-Containing Waste Materials, shall provide all non-asbestos waste containers, and shall make all transportation and disposal arrangements for non-Asbestos-Containing Waste Materials in accordance with federal, state, and local regulations.

D. Labeling: The Contractor shall affix warning labels to all asbestos waste disposal bags, wrapped items, and containers (i.e., drums, dumpsters, trailers, or roll-offs). Labels shall comply with the requirements of federal, state, and local regulations. At a minimum, each label on disposal containers/bags/items shall bear the following information in English:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
[Generator Name, Address, and Telephone Number]

E. Final Visual Inspection and Clearance Air Monitoring: The Independent Third-Party Monitor shall not conduct Clearance Air Monitoring until the Regulated Abatement Work Area has been inspected by the Asbestos Handler Supervisor and the Project Monitor has performed the Final Visual Inspection. During this inspection, the Asbestos Handler Supervisor and the Project Monitor shall determine if the following has been achieved: (a) all ACM and Asbestos-Containing Waste Materials have been abated and removed from the area; (b) the area is clean and dry; (c) Critical Barriers and Isolation Barriers are intact; (d)

Negative Air Pressure Equipment is turned on and functioning. If any of these items have not been achieved, the Contractor shall perform the necessary corrective actions to achieve compliance before conducting the Clearance Air Monitoring.

F. Breakdown of the Regulated Abatement Work Area: Critical Barriers shall not be removed and Negative Air Pressure Equipment shall not be turned off until Clearance Air Monitoring results meet the criteria specified in this Section and RCNY Title 15, Chapter 1 or 12 NYCRR 56.

G. Asbestos Project Completion Form/Asbestos Project Conditional Completion: Upon successful completion of an Asbestos Project performed in the five boroughs, a copy of the Asbestos Project Completion Form (ACP-21) or Asbestos Project Conditional Completion Form (ACP-20) issued by the DEP shall be submitted to the Engineer.

H. Disposal of Wastes: Asbestos-Containing Waste Materials shall be disposed of to ensure that containers do not remain on the job site for longer than necessary. Containers that have reached their storage capacity shall not remain on site and transportation arrangements shall be made for their removal.

I. Disposal Documentation: Once all waste profiles have been completed and signed by DEP, the Contractor shall provide DEP with a “Letter of Acceptance” issued by the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372, 40 CFR 262 and 40 CFR 302, to the DEP for signature as Generator. All manifests and Land Disposal Restrictions (LDRs) must be signed by a DEP employee as per 6 NYCRR 376 and 40 CFR 268, and as described in Section 01 35 45 - Hazardous Materials Control.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02 83 05 – LEAD MANAGEMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials and structures coated with or containing Lead , specified herein, or required to complete the Work. Lead-containing coatings were not identified. The Contractor shall perform a visual inventory of all work areas. If suspect materials are encountered, the Contractor shall sample to confirm the presence of lead-containing coatings.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions (40 CFR 50); minimize the quantity of hazardous waste generated; protect the health and safety of all site personnel and the welfare of the public; and avoid adverse environmental impacts.

C. In the absence of analytical testing results for a specific painted/coated material, air monitoring and worker Personal Protective Equipment (PPE) requirements, including respiratory protection, shall address the potential presence of Lead.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	10
1.06	Quality Assurance	11
1.07	Submittals	13
1.08	Delivery, Storage, and Handling	19
1.09	Spare Parts, Special Tools, and Supplies	19
1.10	Warranty	19
PART 2	PRODUCTS	19
2.01	Manufacturers	19
2.02	Materials / Equipment	19
2.03	Fabrication / Assembling / Finishes	20
2.04	Source Quality Control / Shop Tests	20
PART 3	EXECUTION	20
3.01	Examination / Preparation	20
3.02	Implementation	21
3.03	Field Testing / Quality Control	24
3.04	Startup / Demonstration	25
3.05	Adjusting / Protection / Cleanup	25

1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s), or allowance(s) as set forth in Section 01 27 00 – Measurements and Payments.

B. Payment for the disposal of Lead Wastes (with the exception of painted/coated scrap metal) will not be made until a signed copy of the manifest from the Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of Lead Waste delivered is returned with complete chain-of-custody (COC) documentation to the NYCDEP.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 01 41 00 – Regulatory Requirements

D. Section 01 51 11 – Temporary Water and Sanitary Services

E. Section 01 51 12 – Temporary Heat and Ventilation

F. Section 01 51 30 – Temporary Electrical System

G. Section 01 74 20 – Construction Waste Management

H. Section 02 41 10 – Demolition and Removals

I. Section 02 84 05 – PCB Management

1.04 REFERENCES

A. Definitions

1. Abatement: Any measure or set of measures designed to permanently eliminate Lead Paint hazards (refer to 40 CFR 745.223 for description of what is included). Abatement does not include renovation, remodeling, landscaping, or other activities, when such activities are not designed to permanently eliminate Lead Paint hazards, but instead, are designed to repair, restore, or remodel a given structure or dwelling, even though these activities may incidentally result in a reduction or elimination of Lead Paint hazards. Furthermore, Abatement does not include interim controls, (e.g., the spot removal of a Lead paint/bitumastic coating on a surface in order to perform torch cutting at that location), Operation and Maintenance (O&M) activities, or other measures and activities designed to temporarily reduce Lead Paint hazards.

2. Action Level: Defined by OSHA as individual exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour Time-Weighted Average (TWA). Once an Action Level is met or exceeded, the Contractor is responsible for meeting specific requirements

outlined in the applicable OSHA standard, which may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following Action Levels are pertinent to the disturbance, removal, construction/demolition, and disposal activities associated with painted/coated materials and structures (as per 01 74 20 - Construction Waste Management, 02 41 10 - Demolition and Removals):

a. Lead - 30 μg/m^3 per 29 CFR 1926.62.

3. Area Monitoring: Stationary air sampling outside of a Lead Control Area for the purpose of determining compliance with OSHA's Lead in Construction Standard (29 CFR 1926.62), and for the purpose of ensuring that airborne Lead concentrations remain below 30 ug/m^3 outside of the Lead Control Area during all work activities that have the potential to disturb Lead-Containing Materials or Lead Wastes. All Area Monitoring shall follow pertinent NIOSH (Methods 5503, 7048, 7082, 7105, 7300, 7600, 7604, 7900) or ASTM sampling methodologies.

4. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor who is currently certified by the American Board of Industrial Hygiene (ABIH).

5. Competent Person: Defined in the OSHA Lead in Construction Standard (29 CFR 1926.62) as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them. Duties of the Competent Person include the following: (a) determining prior to the performance of the Work, whether Lead is present in the workplace; (b) establishing Lead Control Areas and assuring that access to and from those areas is limited to authorized personnel; (c) assuring the adequacy of any employee Exposure Monitoring required by OSHA; (d) assuring that all employees exposed to airborne contaminant levels above Action Levels, Permissible Exposure Limits, or Recommended Exposure Limits wear appropriate PPE, respiratory protection, and are trained in the use of appropriate methods of exposure control for all of the contaminants present; (e) assuring that proper Hygiene Facilities are provided and that workers are trained to use those facilities; (f) assuring that engineering controls specific to the contaminants present are implemented, maintained in proper operating condition, and functioning properly.

6. Decontamination Area: Designated area within the Hygiene Facilities for removing gross contamination from PPE (using a HEPA vacuum), washing away contamination that has accumulated on the skin and hair (using soap and water), removing and disposing/washing of contaminated PPE, and donning clean clothing that will not potentially contaminate areas outside of a Lead Control Area's Physical Boundary.

7. DOT Hazardous Materials Transportation Training: Training that meets the criteria outlined in 49 CFR 172.704. This training shall include discussions from 49 CFR 171 of the following: (a) hazardous materials tables within 49 CFR 172; (b) material packaging and labeling within 49 CFR 178; (c) shipping papers and placards within 49 CFR 173; (d) material loading and segregation within 49 CFR 173.

8. EPA Lead-Based Paint Supervisor Training: A training course administered by the EPA or approved company - which includes discussions of the following: (a) worker protection and safety; (b) occupant protection; (c) clan-up and clearance; (d) waste disposal; (e) residence and community relations; (f) regulatory aspects; (g) use of X-Ray Fluorescence (XRF) paint analyzers; (h) legal and insurance issues.

9. Exclusion Zone: (See definition of "Lead Control Area").

10. Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals, for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1) and Lead in Construction Standard (29 CFR 1926.62). Analytical results obtained from Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a work area. For the purpose of this Section, Exposure Monitoring samples shall be collected from individuals who are representative of each type work task being conducted by the Contractor, and all Exposure Monitoring shall follow pertinent NIOSH or ASTM sampling methodologies.

11. Hazardous Waste Operations (HAZWOPER) Training: Training that meets the criteria outlined in the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). A minimum of 24-hour HAZWOPER Training will be required for Abatement work being performed under this Section. However, certain types of work may require 40-hour HAZWOPER Training.

12. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and local exhaust filtration equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

13. Homogenous Materials: Lead-Containing Materials which are similar in appearance, color, texture, and substrate type.

14. Hygiene Facilities: Facilities within the Physical Boundary of a Work area that are set up to prevent cross contamination and are equipped with change areas and separate storage facilities for PPE and clean clothing. Hygiene Facilities shall include adequately supplied hand washing station(s) (i.e.,

running water, soap, and clean towels) or shower(s) (hot and cold water that is controllable at the tap, soap, shampoo, and clean towels).

15. Lead: Defined in the OSHA Lead in Construction Standard (29 CFR 1926.62) as metallic Lead, all inorganic Lead compounds, and organic Lead soaps. Excluded from this definition are all other organic Lead compounds.

16. Lead-Based Paint (LBP): A term used by Department of Housing and Urban Development (HUD) and the EPA to define paint or other surface coatings (e.g., glazes) with Lead levels equal to or exceeding 1.0 milligram per square centimeter (1.0 mg/cm^2) in a paint XRF reading, or 0.5% by dry weight (5,000 mg/kg (ppm)) in a paint chip sample. LBP is subject to the requirements set forth in the OSHA Lead in Construction Standard (29 CFR 1926.62).

17. Lead-Containing Material: Any material that contains, or is coated with, a detectable concentration of Lead.

18. Lead-Containing Paint (LCP): A term used to define paint or other surface coatings (e.g., glazes) with any detectable amount of Lead less than 1.0 milligram per square centimeter (1.0 mg/cm^2) in a paint XRF reading, or 0.5% by dry weight (5,000 mg/kg (ppm)) in a paint chip sample. LCP is subject to the requirements set forth in the OSHA Lead in Construction Standard (29 CFR 1926.62).

19. Lead Control Area: The area within the Physical Boundary where worker Hygiene Facilities are located and where all Work activities take place that involve the disturbance of Lead-Containing Materials and Lead Wastes.

20. Lead Paint: A generic term that refers to both LBP and LCP.

21. Lead Waste: Non-specific liquid or solid waste generated during the Abatement, removal, construction/demolition, handling, or cleanup of a Lead-Containing Material.

22. Organic Vapor Cartridge: A NIOSH approved respirator filter typically containing 25 to 40 grams of sorption media such as activated charcoal.

23. OSHA Lead Awareness Training: Annual training that meets the criteria outlined in the OSHA Lead in Construction Standard (29 CFR 1926.62) for individuals that have the potential to be exposed to Lead-Containing Materials or Lead Wastes. This training shall include discussions of the following: (a) current federal, state, and local regulations pertaining to Lead (including 29 CFR 1926.62) and other heavy metals that may be disturbed during the Work; (b) the health effects of Lead and other heavy metal exposure; (c) state-of-the-art work practices, engineering controls, and procedures for Abatement, removal, construction/demolition, materials handling, waste management, and housekeeping activities that involve Lead-Containing Materials and Lead Wastes; (d) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (e) medical surveillance programs and the medical removal

protection program; (f) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (g) responsibilities of the Competent Person.

24. OSHA Lead in Construction Standard (29 CFR 1926.62): A federal standard that applies to all construction work where an employee may be occupationally exposed to Lead. In this standard, "construction work" is defined as work for construction, alteration, or repair, including painting and decorating. It also includes, but is not limited to, the following: (a) the demolition or salvage of structures where Lead or materials containing Lead are present; (b) the removal or encapsulation of materials containing Lead; (c) new construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain Lead, or materials containing Lead; (d) the installation of products containing Lead; (e) Lead contamination/emergency cleanup; (f) the transportation, disposal, storage, or containment of Lead or materials containing Lead on the site or location at which construction activities are performed; (g) maintenance operations associated with any of the construction activities described in this definition.

25. OSHA Monitoring: (See definition of "Exposure Monitoring").

26. P-100 Filter: (See definition of: "High-Efficiency Particulate Air (HEPA) Filter").

27. Perimeter Monitoring: (See definition of "Area Monitoring").

28. Permissible Exposure Limit (PEL): Defined by OSHA as employee exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour TWA. Once a PEL is met or exceeded for a particular contaminant, the Contractor is responsible for meeting specific requirements outlined in the applicable OSHA standard, which may include worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following PELs are pertinent to removal, demolition, and disposal activities associated with Lead-Containing Materials and Lead Wastes:

    a. Lead - 50 $\mu g/m^3$ per 29 CFR 1926.62.

29. Personal Monitoring: (See definition of "Exposure Monitoring").

30. Physical Boundary: A physical barrier designated with ropes, "caution tape," or a partition that surrounds a work area in order to limit the entry of unauthorized personnel and delineate "clean areas" from areas that may meet or exceed an Action Level, PEL, or REL.

31. Recommended Exposure Limit (REL): An exposure limit recommended by the NIOSH that can be expressed as a TWA, Ceiling Limit, or Short-Term Exposure Limit (STEL). Once an REL is met or exceeded for a particular

contaminant, the Contractor is responsible for ensuring that workers receive appropriate Exposure Monitoring, PPE, including respiratory protection, Hygiene Facilities, medical surveillance, and training.

32. Regulated Area: (See definition of "Lead Control Area").

33. Resource Conservation and Recovery Act (RCRA) Training: Training that meets the criteria outlined in 40 CFR 265.16. This training shall include Site-specific discussions of the following: (a) hazardous waste identification; (b) waste storage container use and labeling; (c) waste storage area management; (d) personal health and safety, including fire safety; (e) manifesting and the off-site transportation of wastes; (f) procedures for using, inspecting, repairing, and replacing emergency equipment and monitoring equipment; (g) procedures for communicating with other employees and outside emergency response personnel; (h) responses to fires or explosions; (i) responses to leaks, spills, and potential groundwater contamination incidents ; (j) the shutdown of operations.

34. Time Weighted Average (TWA): The average time over a given work period (e.g., an 8-hour workday) of a person's exposure to a chemical or agent. The average is determined by sampling for the chemical or agent throughout the time period.

35. Trigger Activities: Certain activities that involve a disturbance of Lead-Containing Materials or Lead Wastes. Depending upon whether the performance of these activities exceeds an Action Level, PEL, or REL, the requirements may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. Examples of Trigger Activities include, but are not limited to, the following: abrasive blasting, welding, torch cutting/burning, heat gun usage, needle gunning/scaling, rivet busting, using a roto peen, mechanical sanding/grinding, using mechanical shears, hand scraping/sanding, chemical stripping, and the manual demolition of Lead-Containing Materials.

36. X-Ray Fluorescence (XRF): An analytical method that can be used in the field for determining the Lead content of paints/coatings on a building component or material surface.

B. Reference Standards

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding Lead-Containing Materials and Lead Wastes. These regulations, standards, and guidelines include, but are not limited to the following:

a. United States (U.S.) Department of Transportation (DOT):

1) 49 CFR 171 - General Information, Regulations, and Definitions;

2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements;

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packaging's;

4) 49 CFR 178 – Specifications for Packaging.

b. United States Environmental Protection Agency (EPA):

1) 40 CFR 50 – National Primary and Secondary Ambient Air Quality Standards;

2) 40 CFR 116 – Designation of Hazardous Substances;

3) 40 CFR 117 – Determination of Reportable Quantities for Hazardous Substances;

4) 40 CFR 260 – Hazardous Waste Management Systems: General;

5) 40 CFR 261 – Identification and Listing of Hazardous Waste;

6) 40 CFR 262 – Standards Applicable to Generators of Hazardous Waste;

7) 40 CFR 263 – Standards Applicable to Transporters of Hazardous Waste;

8) 40 CFR 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;

9) 40 CFR 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;

10) 40 CFR 268 – Land Disposal Restrictions;

11) 40 CFR 302 – Designation, Reportable Quantities, and Notification;

12) 40 CFR 745 – Lead-Based Paint Poisoning Prevention in Certain Residential Structures.

c. National Institute for Occupational Safety and Health (NIOSH):

1) Method 5503 – Polychlorobiphenyls;

2) Method 7082 – Lead by FAAS;

3) Method 7105 – Lead by GFAAS;

4) Method 7300 – Elements by ICP;

5) NIOSH Pocket Guide (NPG) to Chemical Hazards.

d. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies and Procedures – Vol. III, Lead Management;

2) Environmental Health and Safety Policies and Procedures – Vol. IV, Hazardous Waste Management;

3) Environmental Health and Safety Policies and Procedures – Vol. III, EHS Reporting and Investigation

4) RCNY Title 15, Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.

e. New York State Department of Environmental Conservation (NYSDEC):

1) 6 NYCRR 364 – Waste Transporter Permits;

2) 6 NYCRR 370 – Hazardous Waste Management Regulations;

3) 6 NYCRR 371 – Identification and Listing of Hazardous Waste;

4) 6 NYCRR 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities;

5) 6 NYCRR 373 – Hazardous Waste Management Facilities;

6) 6 NYCRR 376 – Land Disposal Restrictions.

f. Occupational Safety and Health Administration (OSHA):

1) 29 CFR 1910 – Occupational Safety and Health Standards;

2) 29 CFR 1910.28 – Safety Requirements for Scaffolding;

3) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response;

4) 29 CFR 1910.134 – Respiratory Protection Standard;

5) 29 CFR 1910.1200 - Hazard Communication Standard;

6) 29 CFR 1926 – Safety and Health Regulations for Construction;

7) 29 CFR 1926.62 – Lead in Construction Standard;

g. Society for Protective Coatings (SSPC):

1) SSPC Guide 6, Guide for Containing Debris Generated During Paint Removal Operations;

2) SSPC Guide 7, Guide for the Disposal of Lead-Contaminated Surface Preparation Debris;

3) SSPC SP COM, Surface Preparation Commentary for Steel and Concrete Substrates;

4) SSPC SP 1, Solvent Cleaning;

5) SSPC SP 2, Hand Tool Cleaning;

6) SSPC SP 3, Power Tool Cleaning;

7) SSPC SP 11, Power Tool Cleaning to Bare Metal;

8) SSPC SP 13/ NACE No.6, Surface Preparation of Concrete;

9) SSPC SP 15, Commercial Grade Power Tool Cleaning.

h. Underwriters Laboratories, Inc. (UL):

1) UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units.

1.05 DESCRIPTION

A. Commencement of Work: Five (5) business days prior to the proposed start of the Work required under this Section at each separate location, the Contractor shall notify the Engineer and the onsite EHS staff. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the Work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed work) and provide estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify other contractors in advance of the disturbance, Abatement, spot removal, construction/demolition, and disposal Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. Unexpected Entry into a Lead Control Area: In the event that DEP personnel must enter a Lead Control Area for emergency reasons, the Contractor shall immediately stop work and cleanup any loose debris, so as to permit the safe entry by DEP personnel. Any disturbance of paints/coatings, dusts, materials, or wastes that may potentially generate airborne concentrations of contaminants equal to or above an OSHA Action Level shall not proceed until all DEP personnel have exited from the Lead Control Area.

E. Meetings: In addition to the pre-construction meeting and Site walk-through, other meetings may be required or may be requested by the Engineer, including briefings with Site operations personnel. Written documentation (i.e., “minutes”) of all

meetings shall be generated by the Contractor, and copies shall be provided to the DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

B. Compliance: In addition to the detailed requirements of this Section and DEP Environmental Health and Safety (EHS) Policies and Procedures, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the disturbance, Abatement, removal, construction/demolition, handling, storage, transportation, and disposal of Lead-Containing Materials and Lead Wastes. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, or federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

C. Rejection of Non-Complying Items:. The DEP reserves the right to reject Contractor materials/tools/submittal items that are deemed inappropriate or unacceptable by the Engineer or DEP. Submittal items that may be deemed inappropriate or unacceptable include proposed TSDFs, vendors, or subcontractors with previous regulatory citations/violations. The DEP further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Contract amount, as approved by the DEP.

D. Suspect Material Characterization: To classify a paint or coating as Lead-containing, a paint chip/coating sample or an XRF reading must be collected. The bulk samples shall be sent to an analytical laboratory meeting the requirements of this Section.

1. Suspect Lead: Although there are no certification requirements pertaining to an individual that collects paint chip/coating samples in an industrial or commercial setting, this Section requires paint chip/coating sampling to be performed by a Lead Sampler.

E. Qualifications:

1. The Paint Removal Company shall have successfully completed at least two (2) projects of comparable scope and methodologies, and shall document the following: (a) the name, address, and phone number of each facility where the Work was performed; (b) the volume and type of each material that was abated/removed; (c) the specific methods of Abatement/removal used (including the tools, technologies, and engineering controls employed).

2. Competent Person:

a. The Competent Person shall have successfully completed:

1) EPA Lead-Based Paint Supervisor Training Certification (current) in accordance with 40 CFR 745.225 (b)(7)(vi); and

2) OSHA Lead Awareness Training (annual); and

3) 24-hr HAZWOPER Training.

b. The Competent Person shall have a minimum of two (2) years' experience on projects involving Lead and has served as the Competent Person on at least three (3) projects of comparable scope and methodologies to the work being conducted under this Section.

3. Waste Manager:

a. The Waste Manager shall have successfully completed:

1) DOT Hazardous Materials Transportation Training; and

2) RCRA Training - Each training course shall have been completed within the past year in the form of either an initial course or a refresher course.; and

3) 24-hr HAZWOPER Training; and

4) OSHA Lead Awareness Training (annual).

b. The Waste Manager shall have a minimum of two (2) years' experience on projects involving hazardous wastes (including Lead). It is acceptable for an individual who meets the criteria of the Competent Person, to also serve as the Waste Manager for this Contract as long as the individual fulfills all of the requirements of this paragraph.

4. Lead Worker:

a. Lead Workers shall have successfully completed:

1) OSHA Lead Awareness Training (annual) as defined in this Section; and

2) EPA-certified Lead Worker Training for all Lead Abatement activities (current). OSHA Lead Awareness Training satisfies the training requirement for other Lead removal activities (e.g., spot removal and demolition work).

b. Each Lead Worker shall have a minimum of one (1) year of experience on projects involving Lead and have worked on at least three (3) projects of comparable scope and methodologies to the work being conducted under this Section.

5. Lead Sampler:

a. Lead Sampler shall have successfully completed:

1) OSHA Lead Awareness Training (annual) as defined in this Section; and

2) EPA Certified Lead Inspector course or EPA-certified Risk Assessor course (current).

b. The Lead Sampler shall have documented experience in collecting paint chip samples.

c. The qualifications of the Lead Sampler must be approved by the Engineer prior to sample/reading collection.

6. Air Monitor:

a. The Air Monitor shall have successfully completed:

1) OSHA Lead Awareness Training (annual).

b. The Air Monitor shall have a minimum of two (2) years' experience in conducting Area Monitoring and Exposure Monitoring on projects involving hazardous wastes (including Lead). It is acceptable for an individual who meets the criteria of the Competent Person or Waste Manager to also serve as the Air Monitor for this Contract as long as the individual satisfies all of the requirements of this paragraph.

1.07 SUBMITTALS

A. Thirty (30) business days prior to the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. Lead Inspection and Sampling Plan: The Contractor shall provide a Lead Inspection and Sampling Plan to identify suspect Lead-Containing Materials and collect confirmatory samples, as appropriate during the inspection. The Lead Inspection and Sampling Plan shall include at a minimum:

a. At a minimum, the inspection shall be performed by an Environmental Professional, who has current OSHA Lead Awareness and EPA Lead Inspector Training, as applicable to the location of the work, and has performed inspection work on at least three (3) projects of comparable scope.

b. Credentials of the laboratory providing sample analysis, including current certification by the New York State Department of Health's (NYSDOH) Environmental Laboratory Approval Program (ELAP) and by the American Industrial Hygiene Association (AIHA).

c. Sample collection, analysis and reporting protocol.

d. Health and safety protocol (Job Hazard Analysis) for all investigative activities.

2. Lead Inspection Report: The Contractor shall provide a Lead Inspection Report prepared by the Environmental Professional summarizing the results of all inspection activities, and as applicable, a sampling narrative,

laboratory data packages and inventory, including photographs, of all identified suspect and confirmed Lead-Containing Materials.

3. Lead Management Plan(s): Work requiring a Lead Management Plan includes Lead Paint Abatement and Lead Paint spot removal activities. The Lead Management Plan shall be signed and dated by a CIH meeting the definition in this Section.

   a. If the Lead-Containing Materials or Lead Wastes that will be disturbed also contain PCBs, it is acceptable to integrate the Lead Management Plan elements into the relevant PCB Management Plan (required under Section 02 84 05 - PCB Management). The Lead Management Plan shall include the following elements:

      1) Lead Control:

         a) Drawings showing the location and details of the following: (a) each Lead Control Area; (b) each Hygiene Facility; (c) proposed electrical hookups; (d) proposed water hookups: (e) each waste storage area: (f) restroom areas; (g) areas designated for eating, drinking, and smoking;

         b) Section on the interfacing of trades (other Contractors) and the sequencing of Lead-Related Work;

         c) Section on the collection, handling procedures, and disposal of Lead-Containing Materials and Lead Wastes (including the collection, filtering, and disposal of wastewater);

         d) Section on the procedures and methodologies that will be used to conduct Exposure Monitoring and Area Monitoring for particulates. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who will be responsible for conducting the air monitoring activities. The Air Monitor shall at a minimum, satisfy the qualification requirements set forth in this Section;

         e) Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

         f) Section on the specific methods and procedures of emissions control that will be used to ensure that airborne contaminant levels do not meet or exceed an OSHA Action Level outside of each Lead Control Area. It should be noted that even after paint/coating

removal, the DEP has found that demolition activities (e.g., torch-cutting abated steel) still have the potential to generate elevated airborne levels of Lead. Therefore, the Contractor shall provide engineering controls to capture potential Lead dusts or fumes emitted during demolition work that involves the cutting or burning of steel structures that have already been abated;

g) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) operation and maintenance practices and procedures that will be used for the tools/equipment; (d) the types of Lead-Containing Materials that may be disturbed or Lead Wastes that may be generated when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) the proposed crew size for the activity and individual employee responsibilities during the activity; (g) housekeeping procedures that will be used during the activity; (h) PPE and proposed respiratory protection that will be used for the activity;

2) Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

3) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment;

4) SDSs: Provide SDSs for all chemical products (including chemical stripping products) to be used for the Work;

5) The name and qualifications (i.e., experience and training documentation) of the Competent Person, who shall satisfy the qualification requirements set forth in this Section and be present whenever Work of this Section is being performed.

b. Waste Management:

1) The identification of Lead-Containing Materials, Lead Wastes, and hazardous wastes (as defined in 40 CFR 116, 40 CFR 260, 40 CFR 261, 6 NYCRR 370 and 6 NYCRR 371) associated with the Work;

2) The estimated quantity of each waste stream (regulated and non-regulated) that will be generated and disposed of/recycled as per 40 CFR 302;

3) The name, address, 24-hour phone number, and current permit documentation for each recycling facility or TSDF indicating that the facility is approved by federal, state, and local regulatory agencies to receive Lead-Containing Materials and Lead Wastes, and that there are no outstanding violations or enforcement actions;

4) Current 6 NYCRR 364 and 40 CFR 263 permit documentation for the waste transporter that will transport Lead-Containing Materials and Lead Wastes from the Work Site to the TSDF;

5) Spill prevention, containment, and cleanup contingency measures to be followed during a suspected Lead emissions/bulk material release or emergency situation;

6) Section on the on-site handling, storage, removal, and disposal of waste materials, including but not limited to, the following: (a) secondary containment system for each drum storage area; (b) description of the waste storage areas; (c) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (d) the types of containers; (e) the submittal of weekly regulated waste inspection and inventory records;

7) The name and qualifications (i.e., experience and training documentation) of the Waste Manager.

c. A detailed schedule for the implementation of the Lead Management Plan elements, including start and completion dates that allow for adequate time for cleanup, inspections, and air monitoring activities.

d. Medical Surveillance: For all activities within a Lead Control Area, each worker shall have: (a) an initial blood testing (including Zinc Protoporphyrin (ZPP) testing), and have a Blood Lead Level (BLL) below 35 micrograms per deciliter (µg/dl)(if the worker's BLL is in excess of 35 µg/dl, the worker shall show medical approval for this Work); (b) a medical exam, including a Pulmonary Function Test (PFT) within the past year; (c) written medical clearance within the past year, by a licensed health care professional, to wear a respirator; (d) a qualitative/quantitative respirator fit-test for the specified respirator within the past year.

e. Employee Documentation: For all activities that take place within a Lead Control Area, each worker shall: (a) have written proof of resumes and training (e.g., certificates) for Lead Workers,

Competent Persons, Waste Managers, and Air Monitors; (b) dates and written proof of initial medical surveillance by the Contractor or other employer within the past year, and proof that the employee is currently participating in the employer's ongoing medical surveillance program in accordance with this Section; (c) dates and written proof of respiratory clearance and a medical exam; (d) dates and written proof of a respirator fit-test.

f. A current (i.e., within the last month) signed and notarized statement disclosing all of the Contractor's or subcontractor's OSHA, EPA, and DOT citations/violations on projects involving Lead within the past three (3) years.

4. Analytical Laboratory Qualifications for Analyzing Suspect Lead-Containing Materials and Lead Wastes: Submit the name, address, and telephone number of each analytical laboratory selected to perform the analyses of waste samples (solid and liquid), air samples collected for Area Monitoring and Exposure Monitoring purposes, and paint/coating samples collected to classify building components, including copies of current AIHA and ELAP certificates, including dates of accreditation/reaccreditation. .

B. Field Reports and Recordkeeping: The Contractor shall maintain and provide the following documentation:

1. Air Monitoring Documentation: All air monitoring results, including COC, and daily air monitoring reports shall be provided to the DEP within 24-hours from the date the samples are collected.

a. Each signed daily air monitoring report shall include, but not be limited to, the following information: (a) sample "start" and "stop" times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) sample location descriptions/sample location drawings/names of individuals being sampled; (e) types (i.e., makes and models) of sampling equipment used; (f) types of sample media (i.e., filters and cassettes) used; (g) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (h) the name of the Air Monitor that conducted the air monitoring; (i) dates that the air monitoring was conducted; (j) work tasks being performed during the air monitoring; (k) unique sample numbers used to identify each sample.

2. Waste Documentation: Completed and signed waste manifests from TSDFs shall be provided to the DEP no later than thirty (30) days after disposal. In addition, on-site waste storage areas shall be inspected weekly by the Waste Manager.

a. Each waste storage area inspection shall be coordinated with the Engineer, documented in the form of a written signed report, and

shall be provided to the DEP within 24-hours of the inspection date. These reports shall include, but not be limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type, physical condition, and quantity; (d) proper label type; (e) secondary containment system; (f) storage area security method to prevent any unauthorized entry; (g) the presence of any containers that violate RCRA generator storage time limitations, as defined in 40 CFR 262.

b. In addition to performing weekly waste storage area inspections, the Waste Manager shall also maintain an ongoing waste inventory, including: (a) specific dates that each waste container was added/removed from the waste storage area; (b) the full name (printed) and signature of the individual responsible for adding/removing each waste container from the waste storage area.

3. Lead Control Area Inspection Documentation: Lead Control Areas shall be inspected daily by the Competent Person.

a. Each daily Lead Control Area inspection shall be documented in the form of a signed written report. All reports shall be provided to the DEP no later than 24-hours after the inspection is completed. The content of these reports shall include : (a) the types of Work being performed; (b) the names of the Lead Workers, Competent Person, Waste Manager, and Air Monitor on site, including company name; (c) the types of air monitoring and the number of samples being collected; (d) any non-compliance issues observed, including the corrective actions that were taken to achieve compliance.

4. Contractor Project Record: The Contractor's Competent Person shall maintain a project record at the Work Site that shall be made available to the Engineer or DEP for review at any time, and shall be submitted to the DEP within 24-hours after the completion of the Work.

a. At a minimum, the Contractor project record shall contain the following information: (a) copies of training certificates for all individuals involved with the Work; (b) copies of all air monitoring results generated during the Work; (c) copies of all available paint chip/coating sample analytical data and XRF analyzer data, as well as paint/coating survey reports related to the Work; (d) copies of all daily sign-in sheets; (e) a list of emergency phone numbers, including the local fire department, local police department, nearest hospital, as well as phone numbers for the Engineer and DEP personnel responsible for administering the Work; (f) a copy of the OSHA Lead in Construction Standard (29 CFR 1926.62); (g) copies of all SDSs pertaining to all chemicals being used during the Work; (h) a copy of the Contractor's Lead Management Plan; (i) copies of all daily Lead Control Area inspection records; (j) copies of all weekly waste storage area inspection records; (k) a copy of the waste

inventory; and (l) a copy of the Contractor's Hazard Communication (HAZCOM) program.

5. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each Lead Control Area for the duration of the Work. The daily sign-in sheets shall be maintained by the Competent Person and shall be made available to the Engineer or DEP for review at any time during the Work. All daily sign-in sheets shall be submitted to the DEP within 24-hours after the completion of the Work.

   a. At a minimum, each daily sign-in sheet shall include: (a) the individual's printed name and signature; (b) company name; (c) the time of entry and exit from each Lead Control Area.

6. HAZCOM Program: The Contractor's HAZCOM program shall be made available to the Engineer or DEP for review at any time during the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by the NIOSH for use in areas where paints/coatings, dusts, materials, or wastes containing contaminants may be disturbed. At a minimum, the Contractor shall provide each individual with a half-face, negative pressure, air purifying respirator equipped with HEPA/P-100 Filter cartridges until Exposure Monitoring results indicate that respiratory protection can be modified. The Contractor's CIH shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with the OSHA Lead in Construction Standard (29 CFR 1926.62).

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to materials or wastes containing contaminants, with appropriate PPE as prescribed by the Contractor's CIH.

C. HEPA Filters: HEPA/P-100 Filters used in vacuuming equipment, power tools, and local exhaust equipment must meet or exceed any manufacturer's

specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Waste Containers: Containers for the storage of all wastes shall be DOT-approved, and shall be provided by the Contractor.

E. Abrasives: Mechanical paint/coating removal equipment shall not use any products containing crystalline silica, and the equipment shall not utilize any non-recoverable materials or any cutting materials which introduce toxic or hazardous materials into the environment.

F. Chemical Strippers: The Contractor shall utilize an environmentally safe chemical paint stripping system, with demonstrated suitability and efficiency in preparing cast-in-place concrete, cement, and plaster surfaces that are free of any visible residues of paints/coatings. The system shall include non-alkaline or alkaline strippers that provide the lowest possible level of toxicity consistent with the types of paints/coatings to be removed. Neutralization products and procedures shall be provided for all alkaline stripping systems, no stripping system shall contain methylene chloride, and the stripping system shall be low in volatile organic compounds (VOCs).

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Hygiene Facilities: The Contractor shall provide functional Hygiene Facilities as defined in this Section that are appropriate for the types of Work to be performed under this Section. The Contractor shall ensure that employees do not leave a Lead Control Area wearing any potentially contaminated PPE. Using compressed air to dislodge dust from clothing/PPE shall be strictly prohibited. The Contractor shall collect, test, and properly dispose of all wastewater generated from Hygiene Facilities.

1. Handwash Stations: The Contractor shall provide functioning handwash stations on all projects that disturb Lead-Containing Materials or Lead Wastes. Handwash stations shall have running water at the tap, clean towels, and soap per 29 CFR 1926.51. Substituting “hand wipes” in place of soap and running water will not be acceptable.

2. Showers: The Contractor shall provide shower facilities in accordance with 29 CFR 1926.62, for use by employees whose airborne exposure to Lead is above the PEL. When shower facilities are necessary, employees are

required to shower at the end of the work shift each day prior to leaving the Lead Control Area that they are working in.

B. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the Lead Control Area as per 01 51 30 Temporary Electrical System. All temporary lighting and temporary electrical service to a Lead Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

C. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall comply with federal, state, and local regulations, including the requirements of OSHA. Signs shall not be removed until all Abatement, removal, and construction/demolition activities have been completed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

WARNING

LEAD WORK AREA

POISON

NO SMOKING, EATING OR DRINKING

1. Each sign shall be appropriately modified to include additional warnings for other contaminants that are identified during Exposure Monitoring.

D. Physical Boundary Delineation: The Contractor shall clearly delineate each Work area and waste storage area with a Physical Boundary as defined in this Section.

E. Work Area Preparation: The Contractor shall utilize HEPA-filtered vacuums, and wet methods during the initial cleaning of each work area. Prior to removal from each work area, all movable objects and mounted objects that can be removed shall be pre-cleaned using HEPA-vacuums and wet methods. Fixed objects that must remain within each work area shall be pre-cleaned using HEPA vacuums and wet methods, and subsequently covered with 6-mil polyethylene sheeting.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the disturbance of Lead-Containing Materials or Lead Wastes must be conducted without damage to, or contamination of equipment or surfaces within the work areas or other areas adjacent to the work areas. All such damage or contamination

shall be immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Prohibited Activities: Contractors shall not conduct activities that are prohibited by OSHA and EPA regulations. The following activities are prohibited, regardless of whether they are conducted subject to an exposure assessment and written compliance program: (a) burning-off paints/coatings; (b) using heat guns operating above 1100oF; (c) dry machine sanding, grinding, or blasting paint without a HEPA vacuum exhaust tool; (d) uncontained hydroblasting or high-pressure washing; (e) welding painted/coated surfaces unless the paint/coating is removed at least 4-inches from area of heat application (per 29 CFR 1926.345(c)(1)), and local exhaust ventilation is used.

3. Test Patches: Prior to choosing the paint removal method(s) for paints/coatings, the Contractor shall perform test patches on surfaces subject to Abatement, to determine if the method(s) meet the requirements of this Section.

4. Mechanical Removal Equipment: When removing paints/coatings from metal surfaces, the paints/coatings must be removed to the extent that only the bare metal remains (i.e., no mill scale remains) as per SSPC SP 2, 3, 11, 15 and COM, as applicable. In the case of substrates other than metal (e.g., concrete, brick, and block), paints/coatings shall be removed from the surface of the substrate as per SSPC SP 13 and SSPC SP COM, as applicable, and managed in accordance with SSPC Guide 7. Acceptance of the Work shall be contingent upon inspection of the substrate surfaces by the Engineer and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and tools meeting the performance specifications outlined below:

    a. Contractor shall utilize a vacuum-assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces as per SSPC Guide 6 and SSPC SP 11, and with demonstrated effectiveness in maintaining Lead emissions below OSHA exposure limits during the disturbance of paints/coatings. Such systems may include dustless needle guns, dustless roto peens, and dustless right-angle grinders, all of which capture dust and debris at the cutting tool edge and transport the material under vacuum conditions to an air-tight disposal container. Dustless needle guns shall only be utilized on metal surfaces.

    b. The vacuum-assisted power tool system shall also be designed to permit the removal and replacement of collection containers under negative pressure in order to prevent the release of dusts. The system shall be equipped with an automatic “shut-off” in the event of vacuum failure.

c. Abrasive/recovery tools shall be monitored at all times by a device capable of determining recovery at the face of each tool, and capable of automatically disabling the tool in the event that recovery levels are insufficient. The monitor, at a minimum, shall have the following features: (a) a remote warning light; (b) an adjustable recovery set point; (c) automatic equipment disabling capabilities; (d) a sensing range of 0 - 5 pounds per square inch (psi); (e) solid state photohelic instrumentation; (f) remote sensing at the face of the tool.

d. The safe recovery point shall be calibrated each day before start-up, or each time a new tool or vacuum source is used. All manufacturer recommendations shall be followed with respect to the set up and use of the monitor, and the manufacturer's operations manual shall be kept on site at all times. A daily log shall be maintained by the Contractor, identifying all calibrations of recovery levels, as well as any “down time” as a result of insufficient recovery levels.

e. The cutting head of the vacuum-assisted power tool system that is used on flat surfaces shall be capable of cutting to within 1-1/2" of any inside corner, molding, or edge, and may include dustless roto peens or dustless needle guns. Tools for corners and moldings shall be specifically designed for that purpose, and conform to all inside corners, outside corners, curved, flat, and angled surfaces that are to be abated under this Section. These tools shall also maintain vacuum control at the work surface/cutting head interface at all times. HEPA vacuum-shrouded needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum-assisted finishing tools, such as right angle grinders, may be used to achieve the SSPC SP 11 standard, but may not be used for primary removal.

f. Vacuum-assisted power tool systems meeting all of the specifications outlined herein, may be used pending the submittal of all required performance documentation, and their acceptance by the Engineer. Any tools which do not meet all of the specifications outlined herein, shall be removed from the project Site immediately, and shall not be used for the Work to be performed under this Section.

5. Chemical Strippers: Acceptance of the Work shall be contingent upon inspection of the abated substrate surfaces by the Engineer, and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and paint stripping systems meeting the performance specifications outlined below:

a. The Contractor shall utilize a chemical paint stripping system with a demonstrated effectiveness in maintaining Lead emissions below OSHA exposure limits during the disturbance of paints/coatings.

The Contractor shall utilize a mechanical ventilation system during the Work that exhausts away from occupied areas. The application of all paint stripping systems shall be in accordance with manufacturer recommendations and SSPC SP 1. Debris shall be managed in accordance with SSPC Guide 7.

b. The Contractor should note that more than one product may be required to strip LCP/coatings. The use of multiple products shall be in accordance with Work practices approved by the individual manufacturer of each chemical paint stripping compound.

c. All chemical paint stripping products shall be presented to the Engineer for approval prior to the start of any Work to be performed under this Section. Also, the manufacturer's labels on each container shall be intact and legible.

d. Chemical paint stripping systems may be used pending the submittal of all required performance documentation, and its acceptance by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Air monitoring for airborne concentrations of Lead shall be conducted by the Air Monitor in accordance with OSHA and as defined in this Section.

a. Exposure Monitoring: For Work involving the disturbance of any detectable concentration of Lead, the Contractor shall collect personal air samples from employees who are anticipated to have the greatest risk of exposure, as determined by the Contractor's CIH or Competent Person. Personal air samples shall be collected during every work shift from at least one (1) employee that is representative of each type of work task that is being performed. Each personal air sample shall "run" for the employee's entire work shift to ensure that enough volume (of air) is collected and an accurate 8-hour TWA can be calculated. Documentation regarding the sample numbers, specific shift when the sampling was conducted, the work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

2. Area Monitoring: The Contractor shall collect a minimum of two (2) area air samples outside of each Lead Control Area on a daily basis for the duration of the Abatement, removal, or construction/demolition Work, as well as any other Work involving the disturbance of Lead-Containing Materials or Lead Wastes. During sampling activities, all air sample filter cassettes shall be positioned approximately five to six feet above the ground (to simulate an individual's breathing zone), and shall not be placed immediately adjacent to obstructions (e.g., walls or columns) which may restrict the flow of air to the filter cassettes. Each air sample shall be

analyzed for all contaminants identified during the exposure assessment. If area air monitoring indicates an emission level in excess of an OSHA Action Level outside of a Lead Control Area, all Work in that area shall be stopped immediately. The Contractor shall then take immediate corrective actions to reduce emission levels to below the Action Level(s), and the Contractor shall clean all adjacent areas that may have become contaminated due to the emissions. Documentation regarding the sample numbers, sample locations, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

3. The Contractor shall submit all air monitoring results to the DEP within 24 hours of date of air sample collection.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of paint chips/coating debris, dusts, and wastes. Dry sweeping and using compressed air to cleanup a Work area shall be strictly prohibited. HEPA-filtered vacuums and wet methods shall be used to ensure that each Work area remains free of visible paint chips/coating debris, dusts, and wastes.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize Lead Wastes (solid and liquid), debris, PPE, and containment materials on a daily basis in accordance with the Lead Management Plan. Where the TCLP analysis for the eight (8) RCRA metals are below hazardous waste standards, all PPE, poly and paint/coating waste will be characterized as Lead-Containing non-hazardous, contaminated waste, and should not be managed as construction and demolition (C&D) debris.

1. The Contractor shall store all wastes in DOT-approved container systems. No drum/container shall be filled in excess of the capacity marked on the drum/container. All drums/containers shall be sealed and covered immediately after filling, and each drum/container shall have an intact and legible label affixed to it.

2. No water mixed with or contaminated by hazardous waste may be released onto the ground or into any drain or sewer (RCNY Title 15, Chapter 19). It should be noted that a discharge of more than 10 pounds of Lead (this includes 10 pounds of debris containing Lead) onto the ground or into the water within a 24-hour period, shall be considered a violation of the Clean Water Act and shall be treated as a “reportable quantity” in accordance with 40 CFR 117. Such a release shall be grounds for immediate termination of this Contract, and the Contractor shall be liable for any fines, penalties, or remediation costs.

3. The Contractor shall store non-hazardous wastes separately from hazardous wastes, shall provide all non-hazardous waste containers, and shall make all transportation and disposal arrangements for non-hazardous wastes in accordance with federal, state, and local regulations.

C. Storage of Wastes: The Contractor shall ensure that all drummed wastes are stored in a secondary containment system, and that each waste storage area is demarcated with a Physical Boundary. In addition, the Contractor shall post weekly waste inspections and waste inventories in the regulated waste storage area, as well as the following emergency information in accordance with DEP's EHS Policies and Procedures: (a) the name and telephone number of the facility's Emergency Coordinator; (b) the location of fire extinguishers and fire alarms; (c) the location of spill control materials; (d) the telephone number for the fire department (unless the facility has a direct alarm).

D. Labeling: The Contractor shall affix warning labels to all waste drums/containers. At a minimum, all hazardous waste labels shall bear the following information in English:

HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]
[Accumulation Start Date]
[Accumulation End Date]

1. If waste classification is pending analysis, labels shall indicate "Hazardous Waste - Pending Analysis." If wastes contain PCBs, drums/containers must also be labeled per Section 02 84 05 - PCB Management.

E. Sampling and Laboratory Analysis of Paint Removal Wastes: For hazardous waste characterization, the Waste Manager shall sample all potential Lead-Containing Waste Streams in accordance with 40 CFR 261 and 6 NYCRR Part 371. All waste samples shall be collected in the presence of the Engineer using the following procedure:

1. One (1) composite waste sample shall be collected for laboratory analysis from each waste drum that is generated. Each composite sample shall be a mixture of four (4) grab samples. As an example, if the drum is full, collect four grab samples, if the drum is half-full, collect two grab samples, and if the drum is one-tenth full, collect one sample. Grab samples shall be composited into one (1) bulk composite sample. Each composite sample shall undergo Toxicity Characteristic Leaching Procedure (TCLP) analysis for the eight (8) RCRA metals.

2. In addition, if the waste stream is associated with the use of a chemical paint stripping system, the Contractor shall have the laboratory analyze each sample for pH and any other RCRA characteristic that may fail due to the chemical composition of the waste. Furthermore, if the waste stream contains PCB-Containing paint/coating chips, the Contractor shall collect samples in accordance with Section 02 84 05 - PCB Management. The Contractor shall ensure that the laboratory being used is also capable of performing these additional analytical tests.

3. One (1) representative wastewater sample shall be collected for laboratory analysis using appropriate field sampling equipment (e.g., a pipette or bailer), and shall be labeled appropriately.

F. Sampling and Laboratory Analysis of Painted Demolition Debris: The Contractor shall collect representative bulk samples of demolition wastes to determine proper disposal. All bulk samples shall undergo TCLP analysis for the eight (8) RCRA metals. Furthermore, if the waste stream may contain PCB-Containing paint/coating chips, the Contractor shall collect samples in accordance with Section 02 84 05 - PCB Management.

1. Scrap Metal Exemption for Recycling: Under 6 NYCRR 371.1(c)(7), painted scrap metal can be sent to a recycling facility, rather than be discarded as hazardous waste. For the DEP to submit a "c7 notification" to the NYSDEC and claim the "scrap metal exemption," the Contractor must first submit notification to their recycling facility indicating that Lead is present on the scrap metal. If PCBs are detected in the paints/coatings on the scrap metal, the Contractor shall also disclose this information to the recycling facility as per Section 02 84 05 - PCB Management. The Contractor shall submit this documentation to the Engineer for approval prior to disposal.

G. Disposal of Wastes: The Contractor shall notify the DEP at least 14 business days prior to the removal of any waste drums/containers. All hazardous waste profiles for containerized wastes must be reviewed by the Engineer and signed by the DEP as the generator of the waste streams. Wastes shall be disposed of so that drums/containers do not remain on the job site for more than 90 calendar days from the initial "accumulation start date" on the drum/container label. Containers that have reached their storage capacity shall not remain on site, and transportation arrangements shall be made for their immediate removal.

H. Disposal Documentation: Once all waste profiles have been completed, the Contractor shall provide the DEP a "Letter of Acceptance" issued from the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372 and 40 CFR 262, to the DEP for signature as Generator. All hazardous waste documentation (e.g., waste profiles, manifests and Land Disposal Restrictions (LDRs)) must be signed by a DEP employee as described in Section

01 35 45- Hazardous Materials Control. Non-hazardous waste documentation may be signed by a DEP-designated alternate.

END OF SECTION

SECTION 02 84 05 – PCB MANAGEMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials and structures coated with or containing polychlorinated biphenyls (PCBs), specified herein, or required to complete the Work. PCB-containing coatings were not identified. The Contractor shall perform a visual inventory of all work areas. If suspect materials are encountered, the Contractor shall sample to confirm the presence of PCB-containing coatings.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions (40 CFR 50); minimize the quantity of hazardous waste generated; protect the health and safety of all site personnel and the welfare of the public; and avoid adverse environmental impacts.

C. In the absence of analytical testing results for a specific painted/bitumastic-coated material, the material shall be classified as PCB-containing and lead-containing. If the material is caulking or has a bitumastic coating, the material shall also be classified as asbestos-containing.

D. Small Capacitors and Fluorescent Light Ballasts manufactured prior to 1978 may contain PCBs in their capacitors or potting materials. Unless a Fluorescent Light Ballast is marked "No PCBs" by the manufacturer, it shall be assumed that the ballast contains PCBs. All PCB-containing light ballasts and Small Capacitors shall be removed, handled, packaged, and disposed of in accordance with this Section.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	10
1.06	Quality Assurance	10
1.07	Submittals	13
1.08	Delivery, Storage, and Handling	21
1.09	Spare Parts, Special Tools, and Supplies	21
1.10	Warranty	21
PART 2	PRODUCTS	21
2.01	Manufacturers	21
2.02	Materials / Equipment	21
2.03	Fabrication / Assembling / Finishes	22
2.04	Source Quality Control / Shop Tests	22
PART 3	EXECUTION	22
3.01	Examination / Preparation	22

3.02 Implementation 23
3.03 Field Testing / Quality Control 26
3.04 Startup / Demonstration 27
3.05 Adjusting / Protection / Cleanup 27

1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s), or allowance(s) as set forth in Section 01 27 00 – Measurements and Payment.

B. Payment for the disposal of PCB Wastes will not be made until a signed copy of the manifest from the Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of PCB Wastes delivered is returned with complete chain-of-custody (COC) documentation to the DEP.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 01 41 00 – Regulatory Requirements

D. Section 01 51 11 – Temporary Water and Sanitary Services

E. Section 01 51 12 – Temporary Heat and Ventilation

F. Section 01 51 30 – Temporary Electrical System

G. Section 01 74 20 – Construction Waste Management

H. Section 02 41 10 – Demolition and Removals

I. Section 02 82 05 – Asbestos Management

J. Section 02 83 05 – Lead Management

1.04 REFERENCES

A. Definitions

1. Abatement: Any measures or set of measures designed to permanently eliminate PCB paint/bitumastic coating hazards. Abatement includes, but is not limited to, the removal of PCB paints/bitumastic coatings or the replacement of PCB-painted/bitumastic-coated surfaces or fixtures. Abatement also includes the removal of paints/bitumastic coatings (with a PCB concentration greater than or equal to 50 parts per million (ppm)) when the underlying substrate is to remain in place. Abatement does not include renovation, remodeling, landscaping, or other activities, when such activities are not designed to permanently eliminate PCB hazards, but instead, are designed to repair, restore, or remodel a given structure or dwelling, even though these activities may incidentally result in a reduction or elimination of PCB hazards. Furthermore, Abatement does

not include interim controls (e.g., the spot removal of a PCB paint/bitumastic coating on a surface in order to perform torch cutting at that location), Operations and Maintenance (O&M) activities, or other measures and activities designed to temporarily reduce PCB hazards.

2. Area Monitoring: Stationary air sampling outside of a PCB Control Area for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1), and for the purpose of ensuring that airborne PCB concentrations remain below 1.0 mg/m^3 (Aroclor 1242) and 0.5 mg/m^3 (Aroclor 1254) outside of the PCB Control Area during all Work activities that have the potential to disturb PCB-Containing Materials with PCB concentrations greater than or equal to 50 ppm. Area Monitoring for lead will be required if Exposure Monitoring results exceed corresponding Action Levels, Permissible Exposure Limits (PELs), or Threshold Limit Values (TLVs). If asbestos is present, Area Monitoring shall also be conducted in accordance with DEP (RCNY Title 15, Chapter 1) or NYSDOL (12 NYCRR 56) regulations. All Area Monitoring shall follow pertinent NIOSH or ASTM sampling methodologies.

3. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor who is currently certified by the American Board of Industrial Hygiene (ABIH).

4. Competent Person: Defined by OSHA as someone who is capable of identifying existing and predictable hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them. Duties of the Competent Person include the following: (a) determining prior to the performance of the Work whether PCBs or lead are present in the workplace; (b) establishing PCB Control Areas and assuring that access to and from those areas is limited to authorized personnel; (c) assuring the adequacy of any employee Exposure Monitoring required by OSHA; (d) assuring that all employees exposed to airborne contaminant levels above Action Levels, PEL, or TLV wear appropriate Personal Protective Equipment (PPE), respiratory protection, and are trained in the use of appropriate methods of exposure control for all of the contaminants present; (e) assuring that proper Hygiene Facilities are provided and that workers are trained to use those facilities; (f) assuring that engineering controls specific to the contaminants present are implemented, maintained in proper operating condition, and functioning properly.

5. Decontamination Area: Designated area within the Hygiene Facilities for removing gross contamination from PPE (using a HEPA vacuum), washing away contamination that has accumulated on the skin and hair (using soap and water), removing, and disposing/washing of contaminated PPE, and donning clean clothing that will not potentially contaminate areas outside of a PCB Control Area's Physical Boundary.

6. DOT Hazardous Materials Transportation Training: Training that meets the criteria outlined in 49 CFR 172.704. This training shall include discussions of the following: (a) hazardous materials tables within 49 CFR 172; (b) material packaging and labeling within 49 CFR 178; (c) shipping papers and placards within 49 CFR 173; (d) material loading and segregation.

7. Exclusion Zone: (See definition of "PCB Control Area").

8. Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals, for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1). Analytical results obtained from Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a work area. For the purpose of this Section, Exposure Monitoring samples shall be collected from individuals who are representative of each type work task being conducted by the Contractor, and all Exposure Monitoring shall follow pertinent NIOSH (Method 5503) or ASTM sampling methodologies.

9. Fluorescent Light Ballast: A device that electrically controls fluorescent light fixtures and includes a capacitor containing 0.1 kilograms (kg) or less of dielectric fluid.

10. Hazardous Waste Operations (HAZWOPER) Training: Training that meets the criteria outlined in the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). A minimum of 24-hour HAZWOPER training will be required for Work being performed under this Section. However, certain types of Work may require 40-hour HAZWOPER Training. All decisions regarding the specific HAZWOPER Training that will be required for each Work task shall be made by the Engineer.

11. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and local exhaust filtration equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

12. Homogenous Materials: PCB-Containing Materials which are similar in appearance, color, texture, and substrate type.

13. Hygiene Facilities: Facilities within the Physical Boundary of a work area that are set up to prevent cross contamination and are equipped with change areas and separate storage facilities for PPE and clean clothing. Hygiene Facilities shall include adequately supplied hand washing station(s) (i.e., running water, soap, and clean towels) or shower(s) (hot and cold water that is controllable at the tap, soap, shampoo, and clean towels).

14. Organic Vapor Cartridge: A respirator filter typically containing 25 to 40 grams of sorption media such as activated charcoal.

15. OSHA Monitoring: (See definition of "Exposure Monitoring").

16. P-100 Filter: (See definition of: "High-Efficiency Particulate Air (HEPA) Filter").

17. PCB Awareness Training: Training for individuals that have the potential to be exposed to PCB-Containing Materials or PCB Wastes. This training shall include discussions of the following: (a) sources of PCBs; (b) current federal, state, and local regulations pertaining to PCBs (including 40 CFR 761) and other contaminants that may be disturbed during the Work; (c) the health effects of PCBs and other contaminant exposures; (d) state-of-the-art work practices, engineering controls, and procedures for Abatement, removal, construction/demolition, materials handling, housekeeping, and waste management activities that involve PCB-Containing Materials and PCB Wastes; (e) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (f) medical surveillance programs; (g) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (h) responsibilities of the Competent Person.

18. PCB Bulk Product Waste: Waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal is greater than or equal to 50 ppm of PCBs.

19. PCB-Containing Material: Any material that contains, or is coated with, a detectable concentration of PCBs.

20. PCB Control Area: The area within the Physical Boundary where worker Hygiene Facilities are located and where all Work activities take place that involve the disturbance of PCB-Containing Materials and PCB Wastes.

21. PCB Hazardous Waste (per NYSDEC): All solid wastes containing PCB concentrations greater than or equal to 50 ppm. Refer to 6 NYCRR Part 371.4(e) for specific details and exceptions regarding the classification of PCB Wastes as "hazardous wastes" (listed waste B001-B007) in New York State.

22. PCB Waste (TSCA-regulated): Non-specific liquid or solid waste generated during the Abatement, removal, construction/demolition, handling, or cleanup of a PCB-Containing Material with a PCB concentration greater than or equal to 50 parts per million (ppm). PCB Waste also includes any waste (including remediation waste, polyethylene sheeting and PPE) that has been in contact with a material that has a PCB concentration greater than or equal to 50 ppm, regardless of whether the waste itself has a PCB concentration of less than 50 ppm. PCB Wastes are

subject to the disposal requirements set forth in Toxic Substances Control Act (TSCA) (40 CFR 761, Subpart D).

23. Perimeter Monitoring: (See definition of "Area Monitoring").

24. Permissible Exposure Limit (PEL): Defined by OSHA as individual exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in milligrams per cubic meter of air (mg/m3) calculated as an 8-hour Time-Weighted Average (TWA). Once a PEL is met or exceeded for a particular contaminant, the Contractor is responsible for meeting specific OSHA requirements, which may include worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following PELs are pertinent to disturbance, removal, construction/demolition, and disposal activities associated with PCB-Containing Materials and PCB Wastes: (a) PCB Aroclor 1254 – 0.5 mg/m3 per 29 CFR 1910.1000, Table Z-1; (b) PCB Aroclor 1242 – 1.0 mg/m3 per 29 CFR 1910.1000, Table Z-1.

25. Personal Monitoring: (See definition of "Exposure Monitoring").

26. Physical Boundary: A physical barrier designated with ropes, "caution tape," or a partition that surrounds a work area in order to limit the entry of unauthorized personnel and delineate "clean areas" from areas that may meet or exceed an Action Level, PEL, or TLV.

27. PCBs: Any group of chlorinated isomers of biphenyl, formerly used in the form of a toxic, colorless, odorless, viscous liquid typically added to lubricants, heat-transfer fluids, and plasticizers.

28. Regulated Area: (See definition of "PCB Control Area").

29. Resource Conservation and Recovery Act (RCRA) Training: Training that meets the criteria outlined in 40 CFR 265.16. This training shall include site-specific discussions of the following: (a) hazardous waste identification; (b) waste storage container use and labeling; (c) waste storage area management; (d) personal health and safety, including fire safety; (e) manifesting and the off-site transportation of wastes; (f) procedures for using, inspecting, repairing, and replacing emergency equipment and monitoring equipment; (g) procedures for communicating with other employees and outside emergency response personnel; (h) responses to fires or explosions; (i) responses to leaks, spills, and potential groundwater contamination incidents; and (j) the shutdown of operations.

30. Small Capacitor: A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric fluid in a quantity less than 1.36 kg or three pounds. If the weight of the dielectric fluid is unknown, it can be assumed that a Small Capacitor is a capacitor that has a total volume of less than 1,639 cubic centimeters (cm^3) or 100 cubic inches (in^3).

31. TLV: Threshold Limit Value

32. TWA: The average time over a given work period (e.g., an 8-hour workday) of a person's exposure to a chemical or agent. The average is determined by sampling for the chemical or agent throughout the time period.

33. Trigger Activities: Certain activities that involve a disturbance of PCB-Containing Materials or PCB Wastes. Depending upon whether the performance of these activities exceeds an Action Level, PEL or TLV, the requirements may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. Examples of Trigger Activities include, but are not limited to, the following: abrasive blasting, welding, torch cutting/burning, heat gun usage, needle gunning/scaling, rivet busting, using a rotopeen, mechanical sanding/grinding, using mechanical shears, hand scraping/sanding, chemical stripping, and the manual demolition of PCB-Containing Materials.

B. Reference Standards

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding PCB-Containing Materials and PCB Wastes. These regulations, standards, and guidelines include, but are not limited to the following:

a. United States (U.S.) Department of Transportation (DOT):

1) 49 CFR 171 - General Information, Regulations, and Definitions

2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packaging's

4) 49 CFR 178 – Specifications for Packaging's

b. United States Environmental Protection Agency (EPA):

1) 40 CFR 50 – National Primary and Secondary Ambient Air Quality Standards

2) 40 CFR 116 – Designation of Hazardous Substances

3) 40 CFR 117 – Determination of Reportable Quantities for Hazardous Substances

4) 40 CFR 260 – Hazardous Waste Management Systems: General

5) 40 CFR 261 – Identification and Listing of Hazardous Waste

6) 40 CFR 262 – Standards Applicable to Generators of Hazardous Waste

7) 40 CFR 263 – Standards Applicable to Transporters of Hazardous Waste

8) 40 CFR 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

9) 40 CFR 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

10) 40 CFR 268 – Land Disposal Restrictions

11) 40 CFR 302 – Designation, Reportable Quantities, and Notification

12) 40 CFR 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

13) Method 8082A (SW-846) – Polychlorinated Biphenyls (PCBs) (soxhlet extraction method 3540) by Gas Chromatography

c. National Institute for Occupational Safety and Health (NIOSH):

1) Method 5503 – Polychlorobiphenyls

d. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;

2) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. IV, Hazardous Waste Management;

3) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. IV, PCB Management;

4) RCNY Title 15, Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers

e. New York City Department of Buildings (DOB) – Building Code (Chapter 33)

f. New York State Department of Environmental Conservation (NYSDEC):

1) 6 NYCRR 364 – Waste Transporter Permits

2) 6 NYCRR 370 – Hazardous Waste Management Regulations

3) 6 NYCRR 371 – Identification and Listing of Hazardous Waste

4) 6 NYCRR 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities

5) 6 NYCRR 373 – Hazardous Waste Management Facilities

6) 6 NYCRR 376 – Land Disposal Restrictions

7) 12 NYCRR 56 – Asbestos

g. Occupational Safety and Health Administration (OSHA):

1) 29 CFR 1910 – Occupational Safety and Health Standards

2) 29 CFR 1910.28 – Safety Requirements for Scaffolding

3) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response

4) 29 CFR 1910.134 – Respiratory Protection Standard

5) 29 CFR 1910.1200 - Hazard Communication Standard

6) 29 CFR 1926 – Safety and Health Regulations for Construction

7) 29 CFR 1926.62 – Lead in Construction Standard

h. Society for Protective Coatings (SSPC):

1) SSPC Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations

2) SSPC Guide 7 - Guide for the Disposal of Lead-Contaminated Surface Preparation Debris

3) SSPC SP 1, Solvent Cleaning

4) SSPC SP 2, Hand Tool Cleaning

5) SSPC SP 3, Power Tool Cleaning

6) SSPC SP 11, Power Tool Cleaning to Bare Metal

7) SSPC SP 13/ NACE No.6, Surface Preparation of Concrete

8) SSPC SP 15, Commercial Grade Power Tool Cleaning

i. Underwriters Laboratories, Inc. (UL):

1) UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units.

1.05 DESCRIPTION

A. Commencement of Work: Five (5) business days prior to the proposed start of the work of this Section at each separate location, the Contractor shall notify the Engineer and the onsite safety staff. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the Work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed Work) and give them estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify other contractors in advance of the disturbance, Abatement, removal, construction/demolition, and disposal Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. Unexpected Entry into a PCB Control Area: In the event that DEP personnel must enter a PCB Control Area for emergency reasons, the Contractor shall immediately stop Work and cleanup any loose debris, so as to permit the safe entry by DEP personnel. Any disturbance of paints/bitumastic coatings, dusts, materials, or wastes that may potentially generate airborne concentrations of contaminants equal to or above an OSHA Action Level shall not proceed until all DEP personnel have exited from the PCB Control Area.

E. Meetings: In addition to the pre-construction meeting and site walk-through, other meetings may be required or may be requested by the Engineer, including briefings to Site Operations personnel. Written documentation (i.e., “minutes”) of all meetings shall be generated by the Contractor, and copies shall be provided to the DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

B. Compliance: In addition to the detailed requirements of this Section, DEP Environmental Health and Safety (EHS) Policies and Procedures, and Section 01 35 27 – Environmental Health and Safety Requirements, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the disturbance, Abatement, removal, construction/demolition, handling, storage, transportation, and disposal of PCB-Containing Materials and PCB Wastes. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and

Procedures, or federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

C. Rejection of Non-Complying Items: The DEP reserves the right to reject Contractor materials/tools/submittal items that are deemed inappropriate or unacceptable by the Engineer or DEP. Submittal items that may be deemed inappropriate or unacceptable include proposed TSDFs, vendors or subcontractors with previous regulatory citations/violations.

D. Suspect Material Characterization: To classify caulking or a paint or bitumastic coating as non-PCB containing, a paint chip/coating sample must be collected as a grab sample from the source. The sample shall be sent to an analytical laboratory meeting the requirements of this Section.

1. Suspect PCB-Containing Paints/Coatings: Although there are no certification requirements pertaining to an individual that collects paint chip samples in an industrial or commercial setting, this Section requires paint chip sampling to be performed by an individual who has successfully completed a PCB Awareness Training course (within the past year) as defined in this Section.

2. Suspect ACM: All caulking and bitumastic coatings are considered suspect ACM. Therefore, if a sample will be collected, the sampling shall be performed by a certified DEP Asbestos Investigator or NYSDOL Asbestos Inspector.

3. Estimate an approximate number of samples to adequately characterize painted/coated surfaces. Collect grab samples that include all layers of paint/coating from different areas randomly dispersed throughout the painted surface area. Grab samples are not to be composited.

4. PCB concentrations are based on the cumulative total of the nine (9) Aroclor cogeners (aka PCB compounds) analyzed by EPA Method SW 846-8082A (soxhlet extraction method 3540) by Gas Chromatography.

E. Qualifications:

1. The Contractor or their proposed PCB removal subcontractor shall have successfully completed at least two (2) projects of comparable scope and methodologies and shall document the following: (a) the name, address, and phone number of each facility where the work was performed; (b) the volume and type of each material that was abated/removed; (c) the specific methods of Abatement/removal used (including the tools, technologies, and engineering controls employed).

2. Competent Person:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a Competent Person who has successfully completed:

1) 40-hr HAZWOPER Training;

2) PCB Awareness Training (annual), and RCRA Training courses as defined in this Section.

a) Each training course shall be current in accordance with the course and regulatory requirements.

b. The Competent Person shall have a minimum of two (2) years' experience with work involving PCBs, and shall have served as the Competent Person on at least three (3) projects of comparable scope and methodologies to the work being performed under this Section.

c. The Competent Person shall be on site during all PCB-related work activities. It should be noted that depending upon the specific contaminants present during the work, additional training for the Competent Person may be required.

3. PCB Waste Manager:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a PCB Waste Manager who has successfully completed:

1) DOT Hazardous Materials Transportation Training;

2) RCRA Training course, completed within the past year in the form of either an initial course or a refresher course;

3) 24-hr HAZWOPER Training;

4) PCB Awareness Training (annual) as defined in this Section.

b. The PCB Waste Manager shall have a minimum of two (2) years experience on projects involving PCB Wastes. It is acceptable for an individual who meets the criteria of the Competent Person, to also serve as the PCB Waste Manager for this Contract as long as the individual fulfills all of the requirements of this paragraph.

4. PCB Worker:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a sufficient number of PCB Workers who have successfully completed:

1) PCB Awareness Training course (annual) as defined in this Section.

b. Each PCB worker shall have a minimum of one (1) year of experience on projects involving PCBs and shall have worked on

at least three (3) projects of comparable scope and methodologies to the work being performed under this Section.

5. Worker (low PCB concentrations):

   a. When disturbing materials and wastes with PCB concentrations less than 50 ppm, the Contractor shall have on staff and assigned to this Contract a sufficient number of workers who have successfully completed:

      1) PCB Awareness Training course (annual) as defined in this Section.

   b. Until a negative exposure assessment has been established via Exposure Monitoring, workers must wear appropriate respiratory protection.

6. Air Monitor:

   a. When disturbing any detectable concentration of PCBs, the Contractor shall have an Air Monitor assigned to this Contract who has successfully completed:

      1) PCB Awareness Training course (annual) as defined in this Section.

   b. The Air Monitor shall have a minimum of two (2) years experience in conducting Area Monitoring and Exposure Monitoring on projects involving PCBs.

   c. It is acceptable for an individual who meets the qualification requirements for Competent Person or PCB Waste Manager to also serve as the Air Monitor for this Contract, as long as the individual satisfies all of the requirements of this paragraph.

1.07 SUBMITTALS

A. Thirty (30) business days prior to the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. PCB Inspection and Sampling Plan: The Contractor shall provide a PCB Inspection and Sampling Plan to identify suspect PCBs, and collect samples, as appropriate during the inspection. This plan shall include at a minimum:

   a. At a minimum, the inspection shall be performed by an Environmental Professional, as defined in this Contract, who shall have PCB awareness training (annual), and OSHA 10-hr certification, and shall have performed similar inspection work on at least three (3) projects of similar scope.

   b. Credentials of the laboratory providing sample analysis, including current certification by the New York State Department of

Health's Environmental Laboratory Approval Program (ELAP) and by the American Industrial Hygiene Association (AIHA).

c. Sample collection, analysis, and reporting protocol.

d. Health and safety protocol (Job Hazard Analysis) for all investigation activities.

2. PCB Inspection Report: The Contractor shall provide a PCB Inspection Report prepared by the Environmental Professional summarizing the results of all inspection activities, and as applicable, a sampling narrative, laboratory data packages, and inventory of all identified suspect and confirmed PCB-Containing Materials.

3. PCB Safe Work Practices: Each Contractor that will disturb PCB-Containing Materials with a PCB concentration less than 50 ppm during the course of Work to be performed under this Section shall submit detailed, project-specific PCB Safe Work Practices designed to protect their workers and control the spread of potential PCB contamination. Work requiring the development of PCB Safe Work Practices includes, but is not limited to, the mechanical disturbance of paints/coatings (e.g., drilling or sawing, or spot removal). The PCB Safe Work Practices shall be signed and dated by a CIH meeting the definition in this Section, and shall include the following elements:

a. Section on the procedures and methodologies that will be used to conduct Exposure Monitoring. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who shall, at a minimum, satisfy the qualification requirements set forth in this Section;

b. Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

c. Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) operation and maintenance practices and procedures that will be used for the tools/equipment (SSPC SP 1, 2, 3, 11, 13 and 15 as applicable); (d) the types of PCB-Containing Materials that may be disturbed when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) housekeeping procedures that will be used during the activity; (g) PPE and proposed respiratory protection that will be used for the activity;

d. Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

e. Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment;

f. SDSs: Provide SDSs for all chemical products to be used for the Work;

g. Medical Clearance for Respiratory Protection: For all activities that disturb PCB-Containing Materials with a PCB concentration less than 50 ppm, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have received a medical exam that included a Pulmonary Function Test (PFT) within the past year; (b) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (c) have received a qualitative or quantitative respirator fit-test for the specific respirator the employee will be using for this Work within the past year;

h. Employee Documentation: For all activities that may disturb PCB-Containing Materials with a PCB concentration less than 50 ppm, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have written proof of training (e.g., certificates) in accordance with the qualification requirements of this Section for workers and Air Monitors that will be used for the Work; (b) dates and written proof of respiratory clearance and a medical exam in accordance with this Article; (c) dates and written proof of a respirator fit-test in accordance with this Article.

4. PCB Management Plan: Each Contractor that will disturb PCB-Containing Materials with a concentration of PCBs greater than or equal to 50 ppm, and PCB Wastes during the course of Work to be performed under this Section shall submit a detailed, project-specific PCB Management Plan that addresses work procedures and equipment to be used during the disturbance, removal, handling, collection, and disposal of PCB-Containing Materials and PCB Wastes. Work requiring a PCB Management Plan includes, but is not limited to, Abatement, spot removal and construction/demolition activities. The PCB Management Plan shall be prepared in accordance with OSHA Construction Standards and all other pertinent federal, state, and local regulations, including DEP (RCNY Title 15, Chapter 1) or New York State Department of Labor (NYSDOL) (12 NYCRR 56) asbestos regulations, only if asbestos is present. In addition, the PCB Management Plan shall follow all DEP EHS Policies and Procedures (referenced in this Section) and shall be coordinated with the Engineer. The PCB Management Plan shall also be signed and dated by a CIH meeting the definition in this Section.

a. If the PCB-Containing Materials or PCB Wastes that will be disturbed also contain asbestos or lead, it is acceptable to integrate

the PCB Management Plan elements into the relevant Asbestos Work Plan (required under Section 02 82 05 - Asbestos Management) or Lead Management Plan (required under Section 02 83 05 - Lead Management and SSPC Guide 7). PCB Management Plan elements that are integrated into an Asbestos Work Plan or Lead Management Plan must still satisfy all of the requirements of this Section. The PCB Management Plan (or relevant Asbestos Work Plan or Lead Management Plan) shall include the following elements:

1) PCB Control:

   a) Drawings showing the location and details of the following: (a) each PCB Control Area; (b) each Hygiene Facility; (c) proposed electrical hookups; (d) proposed water hookups: (e) each waste storage area: (f) restroom areas; (g) areas designated for eating, drinking, and smoking;

   b) Section on the interfacing of trades (i.e., other contractors) and the sequencing of PCB-Related Work;

   c) Section on the collection, handling procedures, and disposal of PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes (including the collection, filtering, and disposal of wastewater). If reusable equipment used during the Work will be in contact with PCB-Containing Materials or PCB Wastes, the Contractor shall submit an equipment decontamination procedure using a Performance-based Decontamination Fluid (PODF) in accordance with 40 CFR 761;

   d) Section on the procedures and methodologies that will be used to conduct Exposure Monitoring and Area Monitoring. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who will be responsible for conducting the Air Monitoring activities. The Air Monitor shall at a minimum, satisfy the qualification requirements set forth in this Section;

   e) Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

f) Section on the specific methods and procedures of emissions control that will be used to ensure that airborne contaminant levels do not meet or exceed an OSHA PEL outside of each PCB Control Area;

g) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used; (c) operation and maintenance practices and procedures that will be used for the tools/equipment; (d) the types of PCB-Containing Materials that may be disturbed or PCB Wastes that may be generated when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) the proposed crew size for the activity and individual employee responsibilities during the activity; (g) housekeeping procedures that will be used during the activity; (h) PPE and proposed respiratory protection that will be used for the activity;

h) Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

i) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment.;

j) SDSs: Provide SDSs for all chemical products (including chemical stripping products and PODFs) to be used for the Work;

k) The name and qualifications (i.e., experience and training documentation) of the Competent Person who shall satisfy the qualification requirements set forth in this Section.

2) Waste Management:

a) The identification of PCB-Containing Materials with a PCB concentrations equal to or greater than 50 ppm, and PCB Wastes associated with the Work;

b) The estimated quantity of each waste stream (regulated and non-regulated) that will be generated and disposed of;

c) The name, address, 24-hour phone number, and current permit documentation for each TSDF

indicating that the facility is approved by federal, state, and local regulatory agencies to receive PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes. The documentation shall include an "acceptance letter" from each TSDF indicating its ability to accept the specific waste streams that will be generated during Work performed under this Section;

d) Current 6 NYCRR 364 permit documentation for the waste transporter that will transport PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes from the work site to the TSDF.;

e) Spill prevention, containment, and cleanup contingency measures to be followed during a suspected PCB emissions/bulk material release or emergency situation.;

f) Section on the on-site handling, storage, removal, and disposal of waste materials, including but not limited to the following: (a) secondary containment system for each drum storage area; (b) description of the waste storage areas; (c) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (d) types of containers; (e) the submittal of weekly regulated waste inspection and inventory records;

g) The name and qualifications (i.e., experience and training documentation) of the PCB Waste Manager.

b. A detailed schedule for the implementation of the PCB Management Plan elements, including starting and completion dates for the Work, and shall allow adequate time for cleanup, inspections, and Air Monitoring activities.

c. Medical Surveillance: For all activities that disturb PCB Containing Materials with PCB concentrations that are greater than or equal to 50 ppm, and PCB Wastes, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have completed initial blood testing for PCBs; (b) have received a medical exam that included a PFT within the past year; (c) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (d) have received a qualitative or quantitative respirator fit-test

within the past year for the specific respirator the employee will be using for this Work.

d. Employee Documentation: For all activities that take place within a PCB Control Area, each worker shall: (a) have resumes and training (e.g., certificates) for PCB workers, Competent Persons, PCB Waste Managers, and Air Monitors; (b) initial medical surveillance, dated within the past year, and proof of participation in the employer's ongoing medical surveillance program; (d) dates and written proof of respiratory clearance and a medical exam; (e) dates and written proof of a respirator fit-test.

e. A current (i.e., within the last month) signed and notarized statement disclosing all OSHA, EPA, and DOT citations/violations within the past three (3) years for the company performing the PCB Abatement.

5. Analytical Laboratory Qualifications for Analyzing Suspect PCB-Containing Materials and Wastes: Submit the name, address, and telephone number of each analytical laboratory selected to perform the analyses of waste samples (solid and liquid), air samples collected for Area Monitoring and Exposure Monitoring purposes, and paint/bitumastic coating samples collected to classify painted/coated surfaces, including. copies of current AIHA and ELAP certificates.

B. Field Reports and Recordkeeping: During all Work performed under this Section, the Contractor shall maintain and provide the following documentation:

1. Air Monitoring Documentation: All PCB Air Monitoring results and daily Air Monitoring reports shall be provided to the DEP within 24-hours from the date the samples are collected, including signed, complete COC documentation.

a. Each signed daily Air Monitoring report shall include, but not be limited to, the following information: (a) sample “start” and “stop” times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) sample location descriptions/sample location drawings/names of individuals being sampled; (e) types (i.e., makes and models) of sampling equipment used; (f) types of sample media (i.e., filters and cassettes) used; (g) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (h) the name of the Air Monitor that conducted the Air Monitoring; (i) dates that the Air Monitoring was conducted; (j) work tasks being performed during the Air Monitoring; (k) unique sample numbers used to identify each sample; and, (l) highlighting of all PEL exceedances.

2. Waste Documentation: Completed and signed waste manifests from TSDFs shall be provided to the DEP no later than thirty (30) calendar days

of disposal. In addition, on-site waste storage areas shall be inspected weekly by the PCB Waste Manager.

a. Each waste storage area inspection shall be coordinated with the Engineer, signed by the inspector, and shall be provided to the DEP within 24-hours of the inspection date. The report shall include: (a) the name of the inspector; (b) descriptions of waste streams; (c) types, quantities, and physical condition of waste containers;(d) proper labeling for each waste containers; (e) secondary containment systems being used; (f) storage area security method to prevent any unauthorized entry.

b. In addition to performing weekly waste storage area inspections, the PCB Waste Manager shall also maintain an ongoing waste inventory, including: (a) specific dates that each waste container was added/removed from the waste storage area; (b) the full name (printed) and signature of the individual responsible for adding/removing each waste container from the waste storage area.

3. PCB Control Area Inspection Documentation: PCB Control Areas shall be inspected daily by the Competent Person.

a. All signed reports shall be provided to the DEP within 24-hours after the inspection is completed. The content of these reports shall include: (a) the types of work being performed; (b) the names of the PCB workers, Competent Person, PCB Waste Manager, and Monitor on site, including company names; (c) the types of Air Monitoring, including the number of samples being collected; (d) any non-compliance issues observed, including the corrective actions that were taken to achieve compliance.

4. Contractor Project Record: The Contractor's Competent Person shall maintain a project record at the Work Site that shall be made available to the Engineer or DEP for review at any time and shall be submitted to the DEP within 24-hours after the completion of the Work.

a. At a minimum, the Contractor Project Record shall contain the following information: (a) copies of training certificates for all individuals involved with the Work; (b) copies of all Air Monitoring results generated during the Work; (c) copies of all available caulking and paint chip/bitumastic coating sample analytical data and survey reports related to the Work; (d) copies of all daily sign-in sheets; (e) copies of all SDSs pertaining to all chemicals being used during the Work; (f) a copy of the Contractor's PCB Management Plan; (g) copies of all daily PCB Control Area inspection records; (h) copies of all weekly waste storage area inspection records; (i) a copy of the waste inventory; (j) a copy of the Contractor's Hazard Communication (HAZCOM) program.

5. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each PCB Control Area. The daily sign-in sheets shall be maintained by the Competent Person and shall be made available to the Engineer or DEP for review at any time during the Work. All daily sign-in sheets shall be submitted to the DEP within 24-hours after the completion of the Work.

   a. At a minimum, each daily sign-in sheet shall include: (a) the individual's printed name and signature; (b) company name; (c) the time of entry and exit from each PCB Control Area.

6. HAZCOM Program: The Contractor's HAZCOM program shall be made available to the Engineer or DEP for review at any time during the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by the NIOSH for use in areas where paints/bitumastic coatings, dusts, materials, or wastes containing contaminants may be disturbed. At a minimum, the Contractor shall provide each individual with a half-face, negative pressure, air purifying respirator equipped with HEPA/P-100 Filter cartridges and Organic Vapor Cartridges, until Exposure Monitoring results indicate that respiratory protection can be modified. The Contractor's CIH shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with OSHA requirements, the Contractor's PCB Management Plan, and any relevant Asbestos Work Plan or Lead Management Plan associated with the Work.

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to materials or wastes containing contaminants, with appropriate PPE as prescribed by the Contractor's CIH.

C. HEPA Filters: HEPA/P-100 Filters used in vacuuming equipment, power tools, and local exhaust equipment must meet or exceed any manufacturer's

specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Waste Containers: Containers for the storage of all PCB Wastes shall be DOT-approved and shall be provided by the Contractor.

E. Abrasives: Mechanical paint/bitumastic coating removal equipment shall not use any products containing crystalline silica, and the equipment shall not utilize any non-recoverable materials or any cutting materials which introduce toxic or hazardous materials into the environment.

F. Chemical Strippers: The Contractor shall utilize an environmentally safe chemical paint stripping system, with demonstrated suitability and efficiency in preparing cast-in-place concrete, cement, and plaster surfaces that are free of any visible residues of paints/bitumastic coatings. The system shall include non-alkaline or alkaline strippers that provide the lowest possible level of toxicity consistent with the types of paints/bitumastic coatings to be removed. Neutralization products and procedures shall be provided for all alkaline stripping systems, no stripping system shall contain methylene chloride, and the stripping system shall be low in volatile organic compounds (VOCs).

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Hygiene Facilities: The Contractor shall provide functional Hygiene Facilities as defined in this Section that are appropriate for the types of Work to be performed under this Section. The Contractor shall ensure that employees do not leave a PCB Control Area wearing any potentially contaminated PPE. Using compressed air to dislodge dust from clothing/PPE shall be strictly prohibited. The Contractor shall collect, test, and properly dispose of all wastewater generated from Hygiene Facilities.

1. Handwash Stations: The Contractor shall provide functioning handwash stations on all projects that disturb PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, or PCB Wastes. Handwash stations shall have running water at the tap, clean towels, and soap per 29 CFR 1926.51. Substituting “hand wipes” in place of soap and running water will not be acceptable.

2. Showers: The Contractor shall provide shower facilities for use by employees whose airborne exposure to PCBs is above an OSHA PEL. When shower facilities are necessary, employees are required to shower at

the end of the work shift each day prior to leaving the PCB Control Area that they are working in.

B. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the PCB Control Area as per 01 51 30 Temporary Electrical System. All temporary lighting and temporary electrical service to a PCB Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

C. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall comply with federal, state, and local regulations, including the requirements of OSHA. Signs shall not be removed until all Abatement, removal, and construction/demolition activities have been completed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

WARNING
PCB WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

1. Each sign shall be appropriately modified to include additional warnings for other contaminants that are identified during Exposure Monitoring.

D. Physical Boundary Delineation: The Contractor shall clearly delineate each work area and waste storage area with a Physical Boundary as defined in this Section.

E. Work Area Preparation: The Contractor shall utilize HEPA-filtered vacuums, and wet methods during the initial cleaning of each work area. Prior to removal from each work area, all movable objects and mounted objects that can be removed shall be pre-cleaned using HEPA-vacuums and wet methods. Fixed objects that must remain within each work area shall be pre-cleaned using HEPA vacuums and wet methods, and subsequently covered with 6-mil polyethylene sheeting.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the disturbance of PCB-Containing Materials and PCB Wastes must be conducted without damage to, or contamination of equipment or surfaces within the work areas or other areas adjacent to the work areas. All such damage or contamination shall be immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Prohibited Activities: Contractors shall not conduct activities that are prohibited by OSHA and EPA regulations. The following activities are prohibited, regardless of whether they are conducted subject to an exposure assessment and written compliance program: (a) burning-off paints/bitumastic coatings; (b) using heat guns operating above 1100° F; (c) dry machine sanding, grinding, or blasting paint without a HEPA vacuum exhaust tool; (d) uncontained hydroblasting or high-pressure washing; (e) welding painted/coated surfaces unless the paint/coating is removed at least 4-inches from area of heat application (per 29 CFR 1926.345(c)(1)), and local exhaust ventilation is used.

3. Test Patches: Prior to choosing the paint removal method(s) for paints/bitumastic coatings, the Contractor shall perform test patches on surfaces subject to Abatement or spot removal, to determine if the method(s) meet the requirements of this Section.

4. Mechanical Removal Equipment: The use of mechanical equipment to remove asbestos-containing caulking or bitumastic coatings will require compliance with DEP (RCNY Title 15, Chapter 1) or NYSDOL (12 NYCRR 56) asbestos regulations, including the use of a full containment enclosure under negative air pressure.

    a. When removing paints/bitumastic coatings from metal surfaces, the paints/bitumastic coatings must be removed to the extent that only the bare metal remains (i.e., no mill scale remains). In the case of substrates other than metal (e.g., concrete, brick, and block), paints/bitumastic coatings shall be removed from the surface of the substrate to the extent that flaking and peeling will not occur subsequent to the performance of the Work. Acceptance of the Work shall be contingent upon inspection of the substrate surfaces by the Engineer and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and tools meeting the performance specifications outlined below:

        1) The Contractor shall utilize a vacuum-assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces to the SSPC SP-11 standard, and with demonstrated effectiveness in maintaining PCB emissions below OSHA exposure limits during the disturbance of paints/bitumastic coatings. Such systems may include dustless needle guns, dustless roto peens, and dustless right-angle grinders, all of which capture dust and debris at the cutting tool edge, and transport the material under vacuum conditions to an air-tight disposal container. Dustless needle guns shall only be utilized on metal surfaces.

2) The vacuum-assisted power tool system shall also be designed to permit the removal and replacement of collection containers under negative pressure in order to prevent the release of dusts. The system shall be equipped with an automatic “shut-off” in the event of vacuum failure.

3) Abrasive/recovery tools shall be monitored at all times by a device capable of determining recovery at the face of each tool, and capable of automatically disabling the tool in the event that recovery levels are insufficient. The monitor, at a minimum, shall have the following features: (a) a remote warning light; (b) an adjustable recovery set point; (c) automatic equipment disabling capabilities; (d) a sensing range of 0 5 pounds per square inch (psi); (e) solid state photohelic instrumentation; (f) remote sensing at the face of the tool.

4) The safe recovery point shall be calibrated each day before start-up, or each time a new tool or vacuum source is used. All manufacturer recommendations shall be followed with respect to the set up and use of the monitor, and the manufacturer's operations manual shall be kept on site at all times. A daily log shall be maintained by the Contractor, identifying all calibrations of recovery levels, as well as any “down time” as a result of insufficient recovery levels.

5) The cutting head of the vacuum-assisted power tool system that is used on flat surfaces shall be capable of cutting to within 1-1/2" of any inside corner, molding, or edge, and may include dustless roto peens or dustless needle guns. Tools for corners and moldings shall be specifically designed for that purpose, and conform to all inside corners, outside corners, curved, flat, and angled surfaces that are to be abated under this Section. These tools shall also maintain vacuum control at the Work surface/cutting head interface at all times. HEPA vacuum-shrouded needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum-assisted finishing tools, such as right-angle grinders, may be used to achieve the SSPC SP 11 standard, but may not be used for primary removal.

6) Vacuum-assisted power tool systems meeting all of the specifications outlined herein, may be used pending the submittal of all required performance documentation, and their acceptance by the Engineer. Any tools which do not meet all of the specifications outlined herein, shall be

removed from the project site immediately, and shall not be used for the Work to be performed under this Section.

5. Chemical Strippers: Acceptance of the Work shall be contingent upon inspection of the abated substrate surfaces by the Engineer and must demonstrate the absence of residual paint/bitumastic coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and paint stripping systems meeting the performance sections outlined below:

   a. The Contractor shall utilize a chemical paint stripping system with a demonstrated effectiveness in maintaining PCB emissions below OSHA exposure limits during the disturbance of paints/bitumastic coatings. The Contractor shall utilize a mechanical ventilation system during the Work that exhausts away from occupied areas. The application of all paint stripping systems shall be in accordance with manufacturer recommendations.

   b. The Contractor should note that more than one (1) product may be required to strip PCB-containing paints/bitumastic coatings. The use of multiple products shall be in accordance with work practices approved by the individual manufacturer of each chemical paint stripping compound.

   c. All chemical paint stripping products shall be presented to the Engineer for approval prior to the start of any Work to be performed under this Section. The manufacturer's labels on each container shall be intact and legible.

   d. Chemical paint stripping systems may be used pending the submittal of all required performance documentation, and its acceptance by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Exposure Monitoring: For Work involving the disturbance of any detectable concentration of PCBs, the Contractor shall collect personal air samples from employees who are anticipated to have the greatest risk of exposure, as determined by the Contractor's CIH or Competent Person. Personal air samples shall be collected during every work shift from at least one (1) employee that is representative of each type of work task that is being performed. Each personal air sample shall "run" for the employee's entire work shift in order to ensure that enough volume (of air) is collected, and an accurate 8-hour TWA can be calculated. Documentation regarding the sample numbers, specific shift when the sampling was conducted, the work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

a. If PCB concentrations being disturbed are less than 50 ppm, Exposure Monitoring may be discontinued following a complete negative exposure assessment and approval from the Engineer and the Contractor's CIH. A negative exposure assessment is defined as current initial exposure monitoring using breathing zone air samples representing the 8-hour TWA exposure for each individual who are representative of each task being conducted. Following discontinuation of exposure monitoring, if there is a change to work practices, exposure monitoring shall again be performed until a second negative exposure assessment is conducted and analyzed.

2. Area Monitoring: If PCB concentrations being disturbed are greater than or equal to 50 ppm, the Contractor shall collect a minimum of two (2) area air samples outside of each PCB Control Area on a daily basis for the duration of the Abatement, removal, or construction/demolition Work, as well as any other Work involving the disturbance of PCB-Containing Materials or PCB Wastes. During sampling activities, all air sample filter cassettes shall be positioned approximately five to six feet above the ground (to simulate an individual's breathing zone) and shall not be placed immediately adjacent to obstructions (e.g., walls or columns) which may restrict the flow of air to the filter cassettes. Each air sample shall be analyzed for all contaminants identified during the exposure assessment. If area Air Monitoring indicates an emission level in excess of an OSHA PEL outside of a PCB Control Area, all Work in that area shall be stopped immediately. The Contractor shall then take immediate corrective actions to reduce emission levels to below the OSHA PEL(s), and the Contractor shall clean all adjacent areas that may have become contaminated due to the emissions. Documentation regarding the sample numbers, sample locations, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

3. The Contractor shall submit all Air Monitoring results to the DEP within 24 hours after the air sample was collected.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of paint chips/coating debris, dusts, and wastes. Dry sweeping and using compressed air to cleanup a work area shall be strictly prohibited. HEPA-filtered vacuums and wet methods shall be used to ensure that each work area remains free of visible paint chips/coating debris, dusts, and wastes. Perform work in accordance with SSPC Guide 6.

1. Equipment Decontamination: All reusable equipment (e.g., hand tools and power tools) that has been in contact with materials that have a PCB concentration greater than or equal to 50 ppm and PCB Wastes, shall be thoroughly decontaminated prior to being removed from the PCB Control Area in accordance with 40 CFR 761.79(c)(2)(i), which permits "swabbing surfaces that have contacted PCBs with a solvent." The solvent shall be a PODF as defined in 40 CFR 761.79(c)(3)(iv)(C) or (D). Used decontamination materials (e.g., rags used to swab equipment) shall be collected, stored, and disposed of in accordance with this Article.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize PCB containing wastes (solid and liquid), debris, PPE, and containment materials on a daily basis in accordance with the PCB Safe Work Practices or PCB Management Plan.

1. If any source sample from a specific work area indicates that PCBs in paints/coatings are greater than or equal to 50 ppm, then all waste from that area will be characterized as TSCA-regulated waste. All waste streams must be segregated into separate drums and labeled with PCB waste labels, including out of service date (when PCB waste is first place in the drum) in addition to RCRA hazardous waste labels (pending analysis). This may include one or more drums for paint chips, chemical stripper waste, and HEPA filters associated with HEPA vacuums. Other waste such as PPE, rags and polyethylene sheeting from a specific work area may be comingled in drums separate from the drums containing paint chips, stripper waste and HEPA filters.

2. If all source samples from a specific work area indicate that PCBs in paints/coatings are less than 50 ppm, then all PPE, poly and paint/coating waste from that area will be characterized as PCB-containing non-hazardous or hazardous waste pending TCLP analysis of the eight (8) RCRA metals in the waste stream and should not be managed as C&D debris. Drums should be labeled with RCRA hazardous waste labels (pending analysis). All waste streams shall be segregated into separate drums. Paint chips and HEPA filters shall be drummed as one waste stream from each work area, and polyethylene sheeting, rags, paper towels and PPE from each work area will be drummed as a separate waste stream.

3. The Contractor shall store all wastes in DOT-approved container systems. All drums/containers shall be labeled, sealed and covered immediately after filling.

4. No water mixed with or contaminated by hazardous waste may be released onto the ground or into any drain or sewer. It should be noted that a discharge of more than 1 lb. of PCBs onto the ground or into the water within a 24-hour period, shall be considered a violation of the Clean Water Act and shall be treated as a "reportable quantity" in accordance with 40 CFR 116, 40 CFR 117, and 40 CFR 302. Such a release shall be grounds

for immediate termination of this Contract, and the Contractor shall be liable for any fines, penalties, or remediation costs.

5. The Contractor shall store non-hazardous wastes separately from hazardous wastes and TSCA-regulated wastes, shall provide all non-hazardous waste containers, and shall make all transportation and disposal arrangements for non-hazardous wastes in accordance with federal, state, and local regulations. TSCA-regulated PCB waste must be disposed within 180 days subject to the requirements of 40 CFR 761.65, in addition to any RCRA hazardous waste storage requirements (i.e., 90 days), as applicable.

C. Storage of Wastes: The Contractor shall ensure that all drummed wastes have secondary containment, and that each waste storage area has a Physical Boundary. In addition, the Contractor shall post weekly waste inspections and waste inventories in the regulated waste storage area, including the following emergency information: (a) contact details for the facility's Emergency Coordinator; (b) map indicating the location of fire extinguishers and spill control materials; (d) the telephone number for the fire department (unless the facility has a direct alarm).

D. Labeling: The Contractor shall affix warning labels to all waste drums/containers. Labels must be filled out completely at the point of generation when waste is first containerized. PCB labels shall be used to designate PCB waste, including out-of-service date, in addition to RCRA hazardous waste labels. At a minimum, all PCB and hazardous waste labels shall bear the following information in English:

CAUTION
CONTAINS PCBs
[Out-of-Service Date – when PCB waste is first placed in drum]
HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]
[Accumulation Start Date]

1. Since waste classification is pending analysis for RCRA/NYSDEC hazardous waste, the RCRA hazardous waste labels shall indicate "PCB/Hazardous Waste - Pending Analysis."

E. Sampling and Laboratory Analysis of PCB-Containing Wastes: For PCB Waste characterization, the PCB Waste Manager shall sample all potential PCB-Containing Waste Streams in accordance with the TSCA (40 CFR 761). According to the EPA, characterizing PCB-containing waste streams (i.e., determining whether wastes are regulated or non-regulated under TSCA) shall be

made based upon the total PCB concentration at the "source" (e.g., the paint/bitumastic coating) prior to any disturbance that may be initiated through Abatement, removal, or construction/demolition activities. Unlike hazardous waste determinations that are made under RCRA (40 CFR 260 and 40 CFR 261), sampling to determine whether a waste is TSCA-regulated shall not be made based on the sampling and analysis of mixed bulk waste materials/debris generated as a result of Abatement, removal, or construction/demolition activities. Instead, source materials for PCBs must be collected as grab samples and must not be composited during collection or analysis as that may reduce the concentration of PCBs detected. Rather, individual source samples shall be submitted for analysis to determine the highest concentration of PCBs contained in the source material or wastes.

1. PCB concentrations are based on the cumulative total of the nine (9) Aroclor congeners (aka PCB compounds) analyzed by EPA Methods SW 846-8082A (soxhlet extraction method 3540) by Gas Chromotography.

2. If PCB concentrations in paints/coatings are present greater than or equal to 50 ppm, all PCB-containing waste generated during paints/coatings disturbance will be classified as TSCA-regulated PCB waste. If PCB concentrations in paints/coatings are less than 50 ppm, all PCB-containing waste generated in the area will be classified as non-TSCA PCB-containing waste.

3. If it cannot be confirmed that the source of drummed waste (e.g., paints/coatings) is non-TSCA-regulated, or no source samples are available, or the soxhlet extraction method 3540 was not used for previous analyses, then four (4) biased worse-case grab samples shall be collected from the drum and each sample analyzed for Total PCBs. If any one grab sample result has a PCB concentration of equal to or greater than 50 ppm, the drummed waste shall be characterized as TSCA-regulated waste.

4. Waste materials/debris generated during Abatement, removal, or construction/demolition activities may be classified as RCRA or NYSDEC hazardous waste (6 NYCRR Part 370 and 6 NYCRR Part 371.4(e)) in addition to being TSCA-regulated. Therefore, wastes/debris must still be sampled and characterized prior to disposal. All waste samples shall be collected in the presence of the Engineer using the following procedure:

    a. Sampling of drummed waste will be biased for the worst-case (highest result) and will be based on inspection of drum contents. For drums with paint chips, with or without stripper waste, collect one grab sample for every quarter of the drum, from any hot spots (i.e., paint chips). As an example, if the drum is full, collect four grab samples, if the drum is half-full, collect two grab samples, and if the drum is one-tenth full, collect one sample. Grab samples shall be composited into one (1) bulk composite sample. For drums with PPE, polyethylene sheeting, rags, and towels, collect up to four (4) grab samples with positive bias for paint chips or paint-

related staining. As such, samples are likely to be collected from dust or chips at the bottom of the drum. Each grab sample shall be composited into one (1) bulk composite sample, labeled, and submitted to a laboratory. Composite samples shall undergo Toxicity Characteristic Leaching Procedure (TCLP) analysis for the eight (8) RCRA metals and Total PCBs to determine if waste is a NYSDEC hazardous waste (i.e., listed waste B007), and any additional parameters that are required by the specific TSDF being used. Furthermore, if the waste stream is associated with the use of a chemical paint stripping system, the Contractor shall have the laboratory analyze each sample for pH and any other RCRA characteristic that may fail due to the chemical composition of the waste.

b. One (1) representative wastewater sample shall be collected for laboratory analysis from each drum generated. Each sample shall be collected using appropriate field sampling equipment (e.g., a pipette or bailer), and shall be labeled and submitted to a laboratory that satisfies the requirements of this Section.

F. Sampling and Laboratory Analysis of PCB-Containing Demolition Debris: The Contractor shall collect representative bulk samples of anticipated demolition wastes to determine proper disposal. In addition to a total PCB analysis of the source materials (e.g., paints/bitumastic coatings), representative bulk samples shall be collected from painted/bitumastic-coated building materials for TCLP analysis for the eight (8) RCRA metals and Total PCBs to determine if waste is a NYSDEC listed hazardous waste (i.e., listed waste B007).

1. Scrap Metal Exemption for Recycling: Under 6 NYCRR Part 371.1(c)(7), painted scrap metal can be sent to a recycling facility, rather than be discarded as hazardous waste. In order for the DEP to submit a "c7 notification" to the NYSDEC and claim the "scrap metal exemption," the Contractor must first submit notification to their recycling facility indicating that PCBs are present on the scrap metal in concentrations less than 50 ppm. If concentrations are greater than or equal to 50 ppm, the scrap metal cannot be recycled and instead must be disposed of as a TSCA-regulated waste. If Lead or other heavy metals are detected in the paints/bitumastic coatings on the scrap metal, the Contractor shall also disclose this information to the recycling facility. The Contractor shall submit this documentation to the Engineer for approval prior to disposal.

G. Bulk demolition debris (e.g., painted concrete) that is sampled and determined to be non-RCRA-regulated and non-TSCA-regulated waste may be disposed of as construction and demolition (C&D) debris as per Section 01 74 20 – Construction Waste Management and Section 02 41 10 – Demolition and Removals.

H. Disposal of Wastes: The Contractor shall notify the DEP at least 14 business days prior to the removal of any waste drums/containers. All waste profiles for containerized wastes must be reviewed by the Engineer and signed by the DEP as

the generator of the waste streams. As per 40 CFR Part 761.207, a Uniform Hazardous Waste Manifest shall be completed for TSCA-regulated and/or NYSDEC hazardous wastes. Wastes shall be disposed of to ensure that drums/containers do not remain on the job site for more than 90 calendar days from the initial "accumulation start date" on the label affixed to the drum/container. Containers that have reached their storage capacity shall not remain on site, and transportation arrangements shall be made for their immediate removal.

1. Small Capacitors and Fluorescent Light Ballasts: Small Capacitors and Fluorescent Light Ballasts are not classified as hazardous wastes under NYSDEC regulations (6 NYCRR 371.3(e)). However, these items are assumed to contain PCBs, and therefore must be disposed of as PCB Bulk Product Wastes unless marked "No PCBs" by the manufacturer. Small Capacitors and Fluorescent Light Ballasts that are not marked "No PCBs" or are leaking (regardless of PCB concentration), must be managed at one of the following facilities in accordance with 40 CFR 761.62(a): (a) in facilities using a TSCA-approved incinerator; (b) at a TSCA/RCRA-permitted landfill; (c) in facilities using an approved alternate method of destroying PCBs; (d) at a facility using an approved method of removing/decontaminating PCBs; (e) using a TSCA PCB Coordinated Approval issued by the EPA Regional Administrator.

I. Disposal Documentation: If asbestos or lead (as defined in Section 02 82 05 - Asbestos Management and Section 02 83 05 - Lead Management) were detected in the wastes, the Contractor shall also ensure that the TSDF is approved by federal, state, and local regulatory agencies to receive these wastes. Once all waste profiles have been completed, the Contractor shall provide the DEP with a "Letter of Acceptance" issued from the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372, 6 NYCRR 373, 40 CFR 262, 40 CFR 263 and 40 CFR 264, to the DEP for signature as Generator. All waste containing PCBs must be identified on the manifest, including out of service date for hazardous waste manifests. All hazardous waste documentation (e.g., waste profiles, manifests, and Land Disposal Restrictions (LDRs)) must be signed by a DEP employee as described in Section 01 35 45 - Hazardous Materials Control. Non-hazardous waste documentation may be signed by a DEP-designated alternate.

END OF SECTION

SECTION 02 84 10 – MERCURY MANAGEMENT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials containing mercury specified herein, or required to complete the Work. No mercury-containing equipment or materials were identified. However, the Contractor may generate universal waste, e.g., temporary site/trailer lighting, during Construction.

B. When necessary, the Contractor shall perform the removal and recycling/disposal of additional materials containing mercury not specified herein.

C. All mercury-containing wastes generated during this Contract Work that qualify as Universal Wastes under federal, state, or local regulations, must be recycled (and not disposed of as hazardous wastes) regardless of the quantity of wastes generated.

D. The Contractor shall perform all Work under this Section without damaging or contaminating adjacent areas to where the Work is being performed. Where such areas are damaged or contaminated, as determined by DEP, the Contractor shall restore the areas to their original condition at no additional cost to the City.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	6
1.06	Quality Assurance	6
1.07	Submittals	7
1.08	Delivery, Storage, and Handling	10
1.09	Spare Parts, Special Tools, and Supplies	11
1.10	Warranty	11
PART 2	PRODUCTS	11
2.01	Manufacturers	11
2.02	Materials / Equipment	11
2.03	Fabrication / Assembling / Finishes	11
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Implementation	12
3.03	Field Testing / Quality Control	12
3.04	Startup / Demonstration	12
3.05	Adjusting / Protection / Cleanup	12

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s), or allowance(s) as set forth in Section 01 27 00 – Measurements and Payment.

B. Payment for disposal of Mercury-Containing Equipment and Material and Mercury Wastes will not be made until a signed copy of the manifest from the recycling facility/Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of mercury-containing equipment and material and mercury wastes delivered is returned to DEP.

1.03 RELATED SECTIONS

A. Section 01 35 27 - Environmental Health and Safety Requirements

B. Section 01 35 45 - Hazardous Materials Control

1.04 REFERENCES

A. Definitions

1. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor or its Subcontractors who is currently certified by the American Board of Industrial Hygiene (ABIH).

2. Competent Person: Defined by OSHA as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them. Duties of the Competent Person include the following: (a) determining prior to the performance of the Work, what contaminants are present in the workplace; (b) establishing work areas and assuring that access to and from those areas is limited to authorized personnel; (c) assuring the adequacy of any employee exposure monitoring required by OSHA; (d) assuring that all employees exposed to airborne contaminant levels above Action Levels, Permissible Exposure Limits (PELs), or Recommended Exposure Limits (RELs) wear appropriate Personal Protective Equipment (PPE), respiratory protection, and are trained in the use of appropriate methods of exposure control for all of the contaminants present; (e) assuring that proper hygiene facilities are provided and that workers are trained to use those facilities; (f) assuring that engineering controls specific to the contaminants present are implemented, maintained in proper operating condition, and functioning properly

3. DOT Hazardous Materials Transportation Training: Training that meets the criteria outlined in 49 CFR 172.704. This training shall include discussions from 49 CFR 171 of the following: (a) hazardous materials tables within 49 CFR 172; (b) material packaging and labeling within 49 CFR 178; (c) shipping papers and placards within 49 CFR 173; (d) material loading and segregation within 49 CFR 173.

4. Hazardous Waste Operations (HAZWOPER) Training: Training that meets the criteria outlined in the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). Certain types of Work may require 24 or 40-hour HAZWOPER Training. All decisions regarding the specific HAZWOPER Training that will be required for each work task shall be made by the Engineer.

5. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. HEPA vacuum equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

6. Mercury-Containing Equipment and Material: Material or equipment/device that contains a detectable amount of elemental mercury, inorganic mercury compounds, or organic mercury compounds. Mercury-Containing Materials may include, but are limited to, the following: batteries, light bulbs, thermometers, thermostats, barometers, manometers, temperature gauges, pressure gauges, and switches.

7. Mercury Awareness Training: Training for individuals that have the potential to be exposed to mercury-containing materials/equipment or mercury wastes. This training shall include discussions of the following: (a) sources of mercury; (b) current federal, state, and local regulations pertaining to mercury; (c) the health effects of mercury exposure; (d) state-of-the-art work practices, engineering controls, and procedures for removal, materials handling, waste management, housekeeping, and spills that involve mercury; (e) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (f) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (g) responsibilities of the Competent Person.

8. Mercury Waste: Non-specific liquid or solid waste generated during the disturbance, removal, construction/demolition, handling, and cleanup of Mercury-Containing Equipment and Material.

9. P-100 Filter: (See definition of: “High-Efficiency Particulate Air (HEPA) Filter”).

10. Physical Boundary: A physical barrier designated with ropes, red “do not enter tape,” or a partition that surrounds a work area in order to limit the entry of unauthorized personnel.

11. Recommended Exposure Limit (REL): An exposure limit recommended by the NIOSH that can be expressed as a Time-Weighted Average (TWA), Ceiling Limit, or Short-Term Exposure Limit (STEL). Once an REL is met or exceeded for a particular contaminant, the Contractor is responsible for ensuring that workers receive appropriate exposure monitoring, PPE, including respiratory protection, hygiene facilities, medical surveillance,

and training. The following REL is pertinent to removal, demolition, and disposal activities associated with Mercury-Containing Equipment and Materials and Mercury Wastes: (a) mercury – 0.05 mg/m^3 as a TWA for up to a ten (10) hour workday and a 40-hour work week, and a ceiling limit of 0.1 mg/m^3, as per DEP Environmental Health and Safety (EHS) Policies and Procedures - Vol. III, Mercury Management.

12. Resource Conservation and Recovery Act (RCRA) Training: Training that meets the criteria outlined in 40 CFR 265.16. This training shall include site-specific discussions of the following: (a) hazardous waste identification; (b) waste storage container use and labeling; (c) waste storage area management; (d) personal health and safety, including fire safety; (e) manifesting and the off-site transportation of wastes; (f) procedures for using, inspecting, repairing, and replacing emergency equipment and monitoring equipment; (g) procedures for communicating with other employees and outside emergency response personnel; (h) responses to fires or explosions; (i) responses to leaks, spills, and potential groundwater contamination incidents; (j) the shutdown of operations.

13. Time Weighted Average (TWA): The average time over a given work period (e.g., an eight (8) hour workday) of a person's exposure to a chemical or agent. The average is determined by sampling for the chemical or agent throughout the time period.

14. Universal Waste: Any Mercury-Containing Material and Equipment that meets the criteria outlined in the Standards for Universal Waste Management (40 CFR 273), the Standards for Universal Wastes (6 NYCRR 374-3), or the Mercury-Added Consumer Products Law (Chapter 145, Laws of New York, 2004). Per 40 CFR 273.4(b)(3), if the mercury is removed from Mercury-Containing Equipment/Material, the material can no longer be considered a Universal Waste and must be managed as a hazardous waste, or a determination must be made to characterize the material as non-hazardous.

B. Reference Standards

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding Mercury-Containing Equipment and Material, and Mercury Wastes. These regulations, standards, and guidelines include, but are not limited to the following:

   a. United States (U.S.) Department of Transportation (DOT):

      1) 49 CFR 171 - General Information, Regulations, and Definitions;

      2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements;

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packaging's;

4) 49 CFR 178 – Specifications for Packaging's.

b. U.S. Environmental Protection Agency (EPA):

1) 40 CFR 273 – Standards for Universal Waste Management;

2) 40 CFR 302 – Designation, Reportable Quantities, and Notification.

c. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies and Procedures – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;

2) Environmental Health and Safety Policies and Procedures – Vol. III, Mercury Management;

3) Environmental Health and Safety Policies and Procedures – Vol. IV, Hazardous Waste Management;

4) Environmental Health and Safety Policies and Procedures – Vol. IV, Universal Waste Management;

5) 15 RCNY Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.

d. New York City Department of Buildings (NYCDOB)

1) New York City Building Code.

e. New York State Department of Environmental Conservation (NYSDEC):

1) 6 NYCRR 364 – Waste Transporter Permits;

2) 6 NYCRR 370 – Hazardous Waste Management Regulations;

3) 6 NYCRR 371 – Identification and Listing of Hazardous Waste;

4) 6 NYCRR 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities;

5) 6 NYCRR 374 – Management of Specific Hazardous Waste;

6) 6 NYCRR 376 – Land Disposal Restrictions.

f. Chapter 145, Laws of New York, 2004 – Mercury-Added Consumer Products Law.

g. National Institute for Occupational Safety and Health (NIOSH):

1) NIOSH Pocket Guide to Chemical Hazards.

h. Occupational Safety and Health Administration (OSHA):

1) 29 CFR 1910 – Occupational Safety and Health Standards;

2) 29 CFR 1910.28 – Safety Requirements for Scaffolding;

3) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response;

4) 29 CFR 1910.1200 - Hazard Communication Standard

5) 29 CFR 1926 – Safety and Health Regulations for Construction.

i. Underwriters Laboratories, Inc. (UL):

1) UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units.

1.05 DESCRIPTION

A. Commencement of Work: Five (5) business days prior to the proposed start of Work at each separate location, the Contractor shall notify the Engineer and the onsite safety staff. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the Work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the Work) and give them estimated periods (including specific dates) of such proposed access restrictions. The Contractor shall not have exclusive rights to the work site and shall fully cooperate and coordinate this Work with the work of Other Contractors who may be on site.

D. Unexpected Entry into a Work Area: In the event that DEP personnel must enter a work area for emergency reasons, the Contractor shall immediately stop work and cleanup any loose debris, so as to permit the safe entry by DEP personnel. Any disturbance of Mercury-Containing Equipment and Material or Mercury Wastes shall not proceed until all DEP personnel have exited from the work area.

1.06 QUALITY ASSURANCE

A. Compliance: In addition to the detailed requirements of this Section, and DEP EHS Policies and Procedures, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the disturbance, removal, construction/demolition, handling, storage, transportation, and recycling/disposal of Mercury-Containing Equipment and Material and Mercury Wastes. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, or federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

1. Rejection of Non-Complying Items: The DEP reserves the right to reject items incorporated into the Work which fail to meet the specified minimum requirements. The DEP also reserves the right to reject Contractor submittal items (e.g., proposed TSDFs, vendors or subcontractors with previous regulatory citations/violations) that are deemed inappropriate or unacceptable by the Engineer or DEP. The DEP further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Contract amount, as approved by the DEP.

B. Qualifications:

1. Competent Person:

a. The Contractor and/or Mercury Removal Company shall have on staff and assigned to this Contract a Competent Person, who shall be onsite during all mercury-related work activities, and who has successfully completed:

1) DOT Hazardous Materials Transportation Training;

2) HAZWOPER Training if required;

3) Mercury Awareness Training; and

4) RCRA Training courses as defined in this Section.

a) Each training course shall have been completed within the past year in the form of either an initial course or a refresher course.

b. The Competent Person shall have a minimum of two (2) years' experience with work involving mercury, including at least three (3) projects of comparable scope and methodologies.

2. Mercury Worker: Mercury workers shall have Mercury Awareness Training, completed within the past year.

1.07 SUBMITTALS

A. Thirty (30) business days prior to the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. Mercury Management Plan: . The Mercury management plan, signed and dated by a CIH, shall include the following elements:

1) Mercury Control:

a) Drawings showing the locations and details of each work area and each waste storage;

b) A detailed discussion regarding the interfacing of trades and the sequencing of Mercury-Related Work;

c) A detailed discussion on the implementation of proper precaution when Mercury-Containing Equipment (gauges, switches, flow meters,

manometers, thermometers, flow regulators, laboratory equipment, lamps, etc.,) is removed to prevent release of elemental mercury onto or into connected equipment or appurtenances;

d) A detailed discussion regarding the collection, handling procedures, and recycling/disposal of Mercury-Containing Equipment and Material and Mercury Wastes;

e) A detailed discussion regarding "real-time" air monitoring for mercury vapor (e.g., using a Jerome® meter), including Action Levels, to be implemented during the Work, as applicable. Also, indicate how compliance with the Action Levels and the REL (per the DEP EHS Policy and Procedure for Mercury Management) will be determined, and who will be responsible for ensuring that compliance with the Action Levels and REL is maintained. At a minimum, Action Levels shall be established for the following situations: (a) the removal of broken/leaking Mercury-Containing Equipment and Material; (b) the implementation of engineering controls and safe work practices; (c) upgrades/downgrades in levels of PPE; (d) work stoppage or the emergency evacuation of on-site personnel;

f) A detailed discussion regarding housekeeping procedures to be used for maintaining clean work areas;

g) A detailed task analysis for each work activity including, but is not limited to, the following information: (a) the type of work activity; (b) the tools/equipment/supplies that will be used; (c) the types of Mercury-Containing Equipment and Material that may be disturbed, or Mercury Wastes that may be generated when performing the activity; (d) the engineering controls that will be used to control the spread of contamination during the activity; (e) the proposed crew size for the activity and individual employee responsibilities during the activity; (f) housekeeping procedures that will be used during the activity; (g) PPE that will be used for the removal of both intact and broken (leaking) Mercury-Containing Equipment, and the decontamination protocol when handling removal of broken (leaking) Mercury-Containing Equipment;

h) SDSs: Provide SDSs for all chemical products to be used during the Work.

b. Waste Management:

1) The identification of Mercury-Containing Equipment and Material and Mercury Wastes (as defined in 40 CFR 116, 40 CFR 260, 40 CFR 261, 6 NYCRR 370 and 6 NYCRR 371) associated with the Work;

2) The estimated quantity of each waste stream that will be generated and recycled/disposed of as per 40 CFR 302;

3) The name, address, phone number (24-hour), and permit documentation for each recycling facility/TSDF, indicating that the facility is approved by federal (40 CFR 264 and 40 CFR 265), state (6 NYCRR 373), and local regulatory agencies to receive Mercury-Containing Equipment and Material and Mercury Wastes;

4) Current Waste Transporter 6 NYCRR 364 and 40 CFR 263 permit documentation;

5) Spill prevention, containment, and cleanup contingency measures, to be followed during a suspected mercury emissions/bulk material release or emergency situation, in accordance with this Section, including 15 RCNY Chapter 19;

6) A detailed discussion of the on-site handling, storage, removal, and recycling/disposal of waste materials, including but not limited to the following:; (a) the methods of demarcation that will be used to identify the waste storage area; (b) the method of collection and containerization of wastes on a daily basis; (c) the types of containers (d) the posting of weekly regulated waste inspection and inventory records.

c. A detailed schedule for the implementation, start date, and completion date of the Mercury Management Plan elements.

d. The name, qualifications (i.e., experience and training documentation), and resume of the Competent Person.

e. Employee Documentation: The Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have written proof of training (e.g., certificates) in accordance with the qualification requirements of this Section for Mercury workers.

f. A current (i.e., within the last month) signed and notarized statement disclosing all of the OSHA, EPA, and DOT citations/violations within the past three (3) years.

B. Field Reports and Recordkeeping: During all Work performed under this Section, the Contractor shall maintain and provide the following documentation:

1. Recycled Materials/Waste Documentation: Completed and signed waste manifests from recycling facilities/TSDFs shall be provided to the DEP within ten (10) business days of disposal. In addition, on-site waste storage areas shall be inspected weekly by the Competent Person.

a. Each weekly waste storage area inspection report shall be provided to the DEP within 24-hours of the inspection date. The content of these reports shall include, but is not limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type, quantity, and condition; (d) recycling/disposal time limit (i.e., 365 days or 90 days, respectively; (e) proper label type; (f) secondary containment system; (g) storage area security method to prevent any unauthorized entry.

b. In addition to performing weekly waste storage area inspections, the Competent Person shall maintain an ongoing waste inventory that includes, but is not limited to, the following information: (a) specific dates that each waste container was added/removed from the waste storage area; (b) the full name (printed) and signature of the individual responsible for adding/removing each waste container from the waste storage area.

2. Contractor Project Record: The Contractor Project Record shall be made available to the Engineer or DEP for review at any time during the Work, and shall be submitted to the DEP within 24-hours after the completion of the Work.

a. At a minimum, the Contractor Project Record shall contain the following information: (a) copies of training certificates for all individuals involved with the Work; (b) copies of all Mercury-Containing Equipment and Material inventory reports relating to the Work; (c) copies of all daily worker sign-in sheets as required in this Section; (d) copies of all SDSs pertaining to all chemicals being used during the Work; (e) related Drawings; (f) a copy of the Contractor's Mercury Management Plan; (g) copies of all weekly waste storage area inspection records; (h) and a copy of the waste inventory.

3. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each work area for the duration of the Work.

4. HAZCOM Program: The Contractor's HAZCOM program shall be made available to the Engineer or DEP for review at any time during the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. PPE: The Contractor shall provide personnel who have a potential to be exposed to Mercury-Containing Equipment and Material or Mercury Wastes, with appropriate PPE as prescribed by the Contractor's CIH.

B. Waste Containers: Containers for the storage of all recyclable materials and wastes shall be DOT-approved and shall be provided by the Contractor.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Utilities: The temporary use of any on-site utilities shall be subject to the approval of DEP. The Contractor shall furnish all water and hoses, water filtration devices, and heating equipment, as well as any temporary hookups. In addition, all temporary lighting and temporary electrical service to a work area shall be provided by the Contractor, and shall be in weatherproof enclosures and be ground fault protected.

B. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall not be removed until all removal and construction/demolition activities have been completed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

WARNING
MERCURY WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

C. Physical Boundary Delineation: The Contractor shall clearly delineate each work area and waste storage area with a Physical Boundary as defined in this Section.

D. Removal

1. Work Area Containment Measures: To prevent potential contamination, the Contractor shall place 6-mil polyethylene sheeting on the floor beneath Mercury-Containing Equipment and Material that are being removed. Any containment materials that become contaminated during the Work shall not be reused, and shall be properly containerized and disposed of in accordance with this Section.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of debris, dusts, and wastes. The Contractor shall perform housekeeping activities, using HEPA-filtered vacuums and wet methods, daily throughout each work shift and at the end of each work shift, to prevent any accumulation of debris, dusts, and wastes in the work areas. Using compressed air to cleanup a work area shall be strictly prohibited.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize Mercury Wastes (solid and liquid), debris, PPE, and containment materials on a daily basis.

1. The Contractor shall store all wastes in DOT-approved container systems. All drums/containers shall be sealed and covered immediately after filling, and each drum/container will have a label affixed to it in accordance with this Article. All labels shall remain intact and legible at all times.

2. No water mixed with or contaminated by mercury may be released onto the ground or into any drain or sewer. It should be noted that a discharge of more than 1 lb. of mercury onto the ground or into the water within a 24-hour period, shall be considered a violation of the Clean Water Act and shall

be treated as a "reportable quantity" in accordance with 40 CFR 117. Such a release shall be grounds for immediate termination of this Contract and the Contractor shall be liable for any fines, penalties, or remediation costs.

3. Any quantity of Elemental Mercury that is released or spilled must be immediately reported to DEP. Reporting to NYSDEC Spill Hotline is required for a release of one pound (approximately two tablespoons) or more.

C. Storage of Wastes: The Contractor shall ensure that all drummed wastes are stored in a secondary containment system, and that each waste storage area is demarcated with a Physical Boundary. In addition, the Contractor shall post weekly waste inspections and waste inventories in the hazardous waste storage area, including the following emergency information in accordance with DEP's EHS Policies and Procedures: (a) the name and telephone number of the facility's Emergency Coordinator; (b) the location of fire extinguishers and fire alarms; (c) the location of spill control materials; (d) the telephone number for the fire department (unless the facility has a direct alarm).

D. Labeling: The Contractor shall affix warning labels to all recycling/waste drums and containers. Labels shall comply with the requirements of federal, state, and local regulations, including EPA and DOT requirements. At a minimum, all labels shall bear the following information in English:

[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[Accumulation Start Date]
[Accumulation End Date]

1. If necessary (i.e., if waste is to be disposed of as hazardous waste rather than Universal Waste), also include the following information on the label:

HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]

E. Characterization of Wastes: Mercury-Containing Equipment and Material to be removed under the Work of this Section shall be recycled in accordance with the EPA's Standards for Universal Waste Management (40 CFR 273), the NYSDEC's Standards for Universal Wastes (6 NYCRR 374-3), and the NYSDEC's Mercury-Added Consumer Products Law (Chapter 145, Laws of New York, 2004). If a material is not regulated as a Universal Waste, the material shall be considered a hazardous waste, and shall be disposed of in accordance with RCRA requirements.

F. Disposal of Wastes: Hazardous wastes shall be disposed of to ensure that drums/containers do not remain on the job site for more than 90 calendar days from

the initial “accumulation start date”. Universal Wastes shall not remain on the job site for more than one (1) year from the initial “accumulation start date”. Containers that have reached their storage capacity shall not remain on site and transportation arrangements shall be made for their immediate removal.

G. Disposal Documentation: Once all waste profiles have been completed and signed by DEP, the Contractor shall provide DEP with a “Letter of Acceptance” issued by the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest, that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372 and 40 CFR 262, to the DEP for signature as Generator. All hazardous waste documentation (e.g., waste profiles, manifests and Land Disposal Restrictions (LDRs)) must be signed by a DEP employee as described in Section 01 35 45- Hazardous Materials Control. Non-hazardous waste documentation may be signed by a DEP-designated alternate.

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of designing, furnishing materials for, fabricating, erecting, and removing formwork, falsework and shoring for cast-in-place concrete as indicated on the Contract Drawings, specified herein and needed for a complete installation.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	11
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Implementation	12
3.03	Field Testing / Quality Control	17
3.04	Startup / Demonstration	17
3.05	Adjusting / Protection / Cleanup	17

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete

B. Section 03 35 00 - Concrete Finishing

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ACI 117 - Standard Tolerances for Concrete Construction and Materials
2. ACI 303 - Guide to Cast-in-Place Architectural Concrete Practice
3. ACI 347 - Guide to Formwork for Concrete
4. ACI SP-4 - Formwork for Concrete
5. American Plywood Association (APA): APA Grade - Trademark
6. ISO 14025 - Environmental labels and declarations - Type III environmental declarations
7. New York State Building Code (NYSBC)
8. Western Wood Products Association (WWPA): Western Lumber Product Use Manual

1.05 DESCRIPTION

1. Formwork materials shall be protected before, during and after erection to insure acceptable finished concrete Work. In-place materials and other operations of work in connection with concrete pours shall be protected.
2. In the event of damage to erected forms, necessary repairs or replacements prior to concrete pours shall be performed at no expense to DEP.
3. The Contractor shall allow sufficient time, as determined by the Engineer from the approved schedule, between erection of forms and placing of concrete for the various trades to properly install their Work.
4. External or superimposed loads, lateral or vertical, shall not be applied on casting concrete until concrete has developed specified 28-day compressive strength and reached the minimum curing age required by Section 03 30 00-Cast-in-Place Concrete.
5. Stay-in-place forms are not permitted unless otherwise shown on the Contract Drawings or approved by the Engineer.

B. Design of Formwork:

1. Formwork shall be designed and constructed in compliance with ACI SP-4 and ACI 303 and to requirements specified herein for exposed-to-view surfaces.

2. The Contractor shall assume responsibility for the design, engineering and construction of formwork unless otherwise specified on the Contract Drawings. Forms shall be designed to produce concrete members identical in shape, lines and dimensions to members shown on the Contract Drawings.

3. The formwork shall be designed for the loads and lateral pressures in accordance with ACI 347 and wind loads as specified by the New York State Building Code.

4. Design forms to include assumed values of live load, dead load, weight of moving equipment operated on formwork, temporary construction material, foundation pressures, stresses, lateral stability, and such other factors pertinent to safety of structure during construction.

5. Construction and control joints, openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, waterstops, anchorages, inserts, and other features shall be provided as required.

6. Formwork shall be designed to be readily removable without impact, shock, or damage to 'green' concrete surfaces and adjacent materials.

7. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.

8. Formwork surface materials shall meet the requirements of Section 03 35 00 - Concrete Finishing.

9. Forms for exposed-to-view concrete surfaces shall be designed to resist the pressures imposed by the liquid concrete placed at a rate of 10 feet per hour or more as required. If Self Consolidating Concrete is used, design the form for full liquid head pressure.

1.06 QUALITY ASSURANCE

A. Unless otherwise noted on the Contract Drawings, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits as given in ACI 117.

B. Mock-ups

1. General: After all formwork shop drawings have been approved and prior to fabricating any formwork, or performing any work on the exposed-to-view concrete, construct mock-ups of the stepped spillway downstream facing shown on the Contract Drawings.

a. It is the Contractor’s responsibility to plan, construct, and allow for review of the mock-ups so no delays or schedule extensions will be encountered.

b. The mock-ups shall be approved prior to performing work on the spillway. If not approved, construct other mock-ups or parts of the mock-ups as directed by the Engineer until approved.

c. The approved mock-ups shall remain until the respective work is complete and will serve as the standard of quality for the exposed-to-view colored concrete work on the spillway. Remove the mock-up in its entirety when directed by the Engineer. The Contractor is responsible for all site restoration work as directed by the Engineer once the mock-up is removed.

d. Concrete class and coloring criteria for the mock-up is specified in Section 03 30 00 – Cast-In-Place Concrete.

e. Finishing of the mock-up is specified in Section 03 35 00 – Concrete Finishing.

2. Mock-up for spillway facing shall be as follows:

a. Mock-up shall be a minimum of two representative step sections, each 10 feet wide, with one horizontal construction joint at the inside corner of the steps; one horizontal construction joint through the textured liner surface, and one vertical construction joint.

b. Brace the back and side vertical surfaces to support the liquid concrete of the facing placements.

c. Two steps are to be constructed vertically for the mockup, representative of upper spillway steps B and C shown on the Contract Drawings. Use a smooth-formed vertical step nose of heights proportional to requirements in the Contract Documents and include all chamfers, drip edges, slopes, form liner, finishes, and other details.

d. Formwork bulkheads at each placement that are assembled as construction joints.

e. Use the specified form liner on surfaces in the completed work as specified in the Contract Documents for the spillway face.

f. Reinforce the steps as typical and shown on the Contract Drawings.

g. Provide necessary footings or placement surface as needed to view the mock-up from all sides and top surfaces.

C. Shop Drawings approvals shall be obtained before custom fabrication is started and before delivery of materials to the Site.

D. Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

E. Formwork erection procedures and health and safety of the work force shall be the responsibility of the Contractor. The requirements of authorities having jurisdiction shall be complied with.

F. Errors of detailing and fabrication and the correct fit of the formwork shall be the responsibility of the Contractor.

G. Materials, fabrications and workmanship found defective shall be promptly removed and replaced and new acceptable work shall be provided in accordance with Contract requirements at no additional expense to DEP.

H. Design of formwork layout, spans, fastenings, joints, and framed openings shall be under the direct supervision of a Professional Engineer, who is licensed and registered in the State of New York with minimum of 10 years of experience in structural design of formwork.

I. For exposed-to-view surfaces the design shall include procedures to attain tightness of joints and means of attaining alignment and maintaining same throughout placement of concrete.

1.07 SUBMITTALS

A. Shop Drawings submitted for approval of the Engineer shall include, but not be limited to, the following data:

1. Design of all field-constructed and prefabricated formwork. The Contractor shall submit drawings and calculations signed and sealed by a professional engineer licensed in the State of New York for form designs and re-shoring.

2. For each type of form required, material type, material thickness, finish, and a dimensional cross-sectional profile.

3. Details of erection, including various connections, layouts of form units placement directions, anchoring and support details, attachment of accessories, each condition requiring enclosures, cut opening, special jointing, and other accessories as required to complete the work.

4. Submit drawings for formwork for exposed-to-view surfaces showing the details of formwork field assemblies, including the mock-ups. Show assembly details of all form joints, crack control joints, construction, expansion, and contraction joints, ties and exposed embedments. Details shall include the back-up materials and show the means to be used to tightly seal all joints and maintain alignment.

5. Drawings for formwork for exposed-to-view surfaces shall show reinforcing steel cover and the locations of clear placing passages through reinforcing for placing trunks, tremmies and hoses for access to the bottom of the form cavity.

B. Manufacturer's specifications and installation instructions for each type of required formwork and accessory shall be submitted. These include each type of sheeting, chamfer strips, form facing materials, form ties, form liners, rustication strips, form release agent, dovetail anchor slots, form coating material, form caulking, and similar items.

C. Manufacturer’s data for formwork for exposed-to-view surfaces shall show type of back-up support system, form facing material, form ties, crack control devices,

form caulking, form joint gasket material, form joint caulking sealant materials, reveal/rustication form strips, form liners, dovetail anchor slots, release agent, form coating material and all other materials for execution of the formwork to meet the specification requirements.

D. Plan for Reshoring: When reshoring is permitted or required, the operations shall be planned in advance and in accordance with acceptable procedures and the requirements of this Section.

1. The Contractor shall submit as a part of the shop drawings a Plan for Reshoring prepared and sealed by a New York State registered professional engineer.

E. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition and at such intervals as will avoid delay in the work.

B. Material shall be stored and protected in a clean, properly drained location. Material shall be kept off the ground under a weather-tight covering permitting good air circulation. Formwork materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure. The maximum uniform distributed storage load shall not exceed 20 pounds per square foot.

C. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless

handling during unloading, storing and erecting. Panels shall be supported by using strong backs while lifting panels in a horizontal position.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. A-2 Cone Snap-in Form Tie shall be as manufactured by:

1. Dayton Superior.
2. Williams Form Engineering Corp.
3. Symons Corp.
4. Or approved equal.

B. Form caulking shall be as manufactured by:

1. Series 1200 Construction Caulking; GE Silicones/Momentive Performance Materials, Inc., Waterford, NY.
2. Dow Corning 999-A; Dow Corning Co., Auburn, MI.
3. Or approved equal.

C. Form release agent shall be as manufactured by:

1. Specco F-100; Specco Industries, Inc., Lemont, IL.
2. Debond Form Coating; L&M Construction Chemicals, Inc., Omaha, NE.
3. Magic Kote; Symons Corporation, Des Plaines, IL.
4. Or approved equal.

D. Form release coating shall be as manufactured by:

1. Cretelese 880-VOC; Cresset Chemical Co., Weston, OH
2. Or approved equal.

E. Form film shall be as manufactured by:

1. Symons Corporation, Des Plaines, IL.
2. Or approved equal.

F. Form liners shall be as manufactured by:

1. Fitzgerald Formliner Pattern #17928 Western Basalt.
2. Or approved equal.

G. Rustications shall be as manufactured by:

1. Symons Corporation, Des Plaines, IL.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Lumber

1. Only stress-grade lumber shall be provided. Form framing, sheathing and shoring shall conform to WWPA Western Lumber Product Use Manual.
2. For lumber in contact with concrete, the lumber shall be provided with dressed or tongue-and groove edges on at least the side contacting the concrete, unless otherwise indicated on the Contract Drawings.

B. Plywood

1. Only grade-marked plywood conforming to APA shall be provided.
2. B-B Plyform, Exterior Class 1 or 2, or High Density Overlay (HDO) form plywood, Class 1 or 2 conforming to U.S. Product Standard PS-1 shall be provided.
3. Thickness shall be as required to maintain alignment and surface smoothness, but not less than 5/8 inch.

C. Steel Forms

1. Commercial grade sheets not less than 16 gage shall be provided.
2. Steel forms in rust-free condition shall be maintained by use of steel wool and light grinding, followed by coats of the specified release agent.
3. Stock material that is free from warps, bends, kinks, cracks, and rust or other matter that could stain the concrete shall be provided.
4. Panels shall be fabricated in conformance with the approved submittals.
5. Outward facing surfaces shall be reinforced as required to prevent warpage and deformation during concrete placement.

D. Form Ties

1. Commercially manufactured type form ties, hangers, and clamps of such type that, after removal of the forms, metal will not be closer than concrete cover as indicated on the Contract Drawings from concrete surface shall be provided. Non-fabricated wire ties will not be permitted.
2. A cone-shaped, snap-in type form tie suitable for the intended use with a working load as required and an integral hot forged head shall be provided.

3. Ties with swaged washers or other suitable devices to prevent seepage of fluid along the ties shall be provided. Ties shall be left in place. She-bolt with water seals shall be provided.

4. Form ties for all liquid-retaining structures shall have waterstop at mid-thickness of wall.

5. Lugs, cones, washers, or other devices which do not leave holes or depressions greater than 1-inch in diameter shall be provided.

6. Form Ties for Exposed-to-View Surfaces:

   a. Tie shall not be used on the spillway facing formwork.

   b. Ties in wall surfaces, as shown on the Contract Documents, shall be one of the following, as approved by the Engineer:

      1) Ties shall be PVC tube and rod ties. Tube shall have a removable section at end that leaves a 1" hole in the concrete surface.

      2) PVC tube spreader with a cone and through rod.

      3) Coil/strut spreader with a cone and a stud back-up connector.

      4) Fiberglass through rod, 3/8" or 1/2" round.

      5) Tapered She-bolt or He-bolt, 5/8" round at form penetration.

E. Chamfer Strips

1. 3/4 inch by 3/4 inch triangular fillets shall be provided, all of which shall be milled from clear, straight-grain pine, surfaced each side, or all of which shall be extruded vinyl type with or without nailing flange unless otherwise indicated on the Contract Drawings.

F. Inserts

1. Galvanized cast steel or galvanized welded steel inserts, complete with anchors to concrete and fittings such as bolts, wedges and straps shall be provided.

G. Dovetail Anchor Slots

1. Dovetail anchor slots manufactured from 22 gage, electro-galvanized steel with removable felt or polyurethane filler shall be provided, where indicated on the Contract Drawings.

H. Shop Fabricated Form

1. Forms shall be fabricated in accordance with the approved submittals.

2. Forms shall be maintained clean, smooth, and free from imperfections and warpage.

3. Locate joints as indicated on the approved Shop Drawings.

a. Form panels shall be arranged in symmetrical patterns conforming to the general lines of the structure.

b. Except when otherwise indicated on the Contract Drawings, panels on vertical surface shall be oriented with the long dimension horizontal joints level and continuous.

c. Form panels on each side of the panel joint shall be precisely aligned by means of fasteners common to both panels, to result in a continuous, unbroken concrete surface.

d. Largest stock size practicable shall be provided.

e. Between form joints, areas less than the stock size of the form liner material shall be lined with a single piece of liner material.

I. Form Caulking

1. Form caulking shall be a one-component, gun-grade silicone sealant that is capable of producing flush, watertight and non-absorbent surfaces and joints. Sealant shall be compatible with the type of forming material and concrete ingredients used.

2. Joint sealing material for the spillway facing formwork shall be as follows:

a. Foam gaskets for sealing field erected corner form joints shall be foam rubber or neoprene tape, paper backed, with pressure sensitive, adhesive on one side, and shall be of sufficient widths, thickness and compressibility for specific use. Tape may be a standard household weather strip, or approved equal.

b. Sealant for sealing permanent shop or bench fabricated unrevealed joints shall be silicone caulking. Sealant shall be “Silprif” as manufactured by General Electric; “Silicone caulk” by DAP Corp., or approved equal.

J. Form Release Agent

1. Form release agent shall be a VOC compliant commercial formulation form-coating compound that will not bind with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds.

2. Form Release Coating: Colorless, non-staining and having no deleterious effects on the concrete, manufactured specifically for non-absorbent surfaces and for reducing surface voids. Release Coating shall be “Cretelese 880-VOC” by Cresset Chemical Co., Weston, OH, or approved equal.

3. Do not apply Form Release Agent to any stay-in-place formwork as detailed on the Contract Drawings.

K. Form Film

1. Form film shall conform to the requirements of form release agent above.
    a. Thinner shall be provided as recommended by manufacturer of the form film.

L. Form Liners

1. Form liners shall be provided as specified herein and/or shown on the Contract Drawings.
2. Select Exposed-to-View surfaces as indicated on the Contract Drawings shall be formed with the following materials:
    a. Textured Form Surfaces:
        1) The spillway facing form material, as shown in the Contract Documents, shall be formed with a Form Liner attached to a backing panel as recommended by the form liner manufacturer.
        2) The Form Liner shall match liner pattern produced by Fitzgerald Form Liners Inc., #17928 Western Basalt.

M. Rustications

1. Rustications shall be provided as specified herein and/or shown on the Contract Drawings.

N. Reinforcing Materials

1. Accessories in contact with vertical form surfaces shall be high density plastic “wheels”. Feet in contact with the form shall be maximum 1/8” x 1/2”. Center hole engaging reinforcing shall hold the wheel tight to the bar and maintain the dimension required under placing conditions. Multi-leg string spacers will not be permitted.
2. Tie wire used to secure reinforcing steel adjacent to architectural form surfaces shall be non-corrosive or plastic coated wire.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the Work shall be field verified.

Variances and discrepancies from the Contract Drawings and potential interferences shall be reported promptly to the Engineer.

2. Sufficient field measurements shall be taken prior to preparation of Shop Drawings and fabrication of construction materials, where possible, to ensure proper fitting of the work. However, job progress shall not be delayed. The Contractor shall allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the work.

3. Actual field-verified conditions may require modifications to the fabrication and/or erection details as indicated on the Contract Drawings. The Work shall be performed to meet actual field conditions encountered.

B. Preparation

1. The Contractor shall examine the areas and conditions under which the Work of this Section is to be performed. Conditions detrimental to the proper and timely completion of the Work shall be corrected. Work shall not proceed until unsatisfactory conditions have been corrected. Prior to placement of concrete, forms shall be inspected for cleanliness and accuracy of alignment.

2. Earth cuts shall not be used as forms for vertical surfaces, unless noted on the Contract Drawings.

3. Where different levels are indicated for wall footings, the footings shall be stepped. Unless otherwise indicated on the Contract Drawings, steps in wall footings shall not be of greater height than the thickness of the footings and steps shall not lap less than 6 inches. No form shall be set at the back of such steps and where earth has slumped off in such locations it shall be cut back to a vertical plane just before the concrete is placed.

3.02 IMPLEMENTATION

A. Erection and Installation

1. Forms shall be constructed in accordance with ACI 347 to required dimensions, plumb, straight and mortar tight, and all joints and seams shall be made mortar-tight. Forms shall be substantial, properly braced, and tied together to maintain position and shape and to resist all pressures to which they may be subject. Unless otherwise noted on the Contract Drawings, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits in ACI 117.

2. The size and spacing of studs and wales shall be determined by the nature of the work and the height to which concrete is placed. Forms shall be made adequate to produce true, smooth surfaces.

3. Forms shall be supplied for repeated use in sufficient number to ensure the required rate of progress. Forms shall be cleaned and inspected

immediately prior to depositing concrete. Deformed, broken or defective forms shall be removed from the work.

4. Joints shall be snug and tight and shall occur only at the designated locations. Construction and control joints other than those shown on the Contract Drawings shall be approved by the Engineer. Horizontal joints shall be level, and vertical joints shall be plumb. Joints shall be made perpendicular to the main reinforcement except where otherwise indicated on the Contract Drawings.

5. Temporary openings shall be provided where interior area of formwork is inaccessible for cleanout or inspection before concrete placement, and for placement of concrete. Temporary openings shall be securely braced and set tightly to forms to prevent the loss of concrete mortar. Temporary openings shall be located on forms in locations as inconspicuous as possible consistent with the requirements of the work.

6. Openings shall be provided in concrete formwork of the correct size and in the proper location to accommodate other operations of construction work in the project. Expansion joint material, waterstops, and other embedded items to be built into forms shall be accurately placed and securely supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

7. Edge forms or bulkheads and intermediate screed strips for slabs shall be set to obtain required elevations and contours in the finished slab surface.

8. Forms shall be set sufficiently to prevent joints in wood forms from opening prior to concrete pour.

9. Cutting form ties back from the face of the concrete shall not be permitted.

10. Formwork shall be observed continuously while concrete is being placed to see there are no deviations from desired elevation, alignment, plumbness and camber. If, during casting, weakness develops and the formwork shows settlement, deflection or distortion, the Work shall be stopped, improperly cast concrete shall be removed and the formwork shall be reconstructed to perform properly.

    a. Forms for columns, beams, girders, walls and window openings shall be erected in accordance with ACI 117, with a maximum camber of 3/4-inch in 20 feet. Column sides shall be clamped with metal column clamps, or equal, spaced according to manufacturer’s recommendation. Exposed external angles of columns, beams, girders and walls, except where specially shown on the Contract Drawings shall be provided with 3/4-inch bevel strips securely nailed on all concrete formwork including concrete encasement of structural steel shapes.

11. Form release agents shall be applied in accordance with manufacturer's instructions and as specified herein:

    a. Form contact surfaces shall be coated with form release agent compound before reinforcement is placed. Excess form release agent material shall not be allowed to accumulate in the forms or to come into contact with surfaces which are required to be bonded to fresh concrete such as concrete reinforcement and embedded items.

    b. Steel forms shall be coated with non-staining, rust-preventive form oil or otherwise shall be protected against rusting. Rust-stained steel surfaces in contact with concrete shall not be used.

12. Excess form coating material shall not be allowed to accumulate in the forms.

13. Form coatings shall not be allowed to come in contact with construction joints or reinforcing steel.

14. Runways for moving equipment shall be provided with struts or legs and supported directly on the formwork or structural member without resting on the reinforcing steel.

15. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

16. All sleeves, inserts, anchors, and embedded items required for adjoining work or for support of joining work shall be placed prior to concreting.

17. Architectural Formwork:

    a. Form liners and rustication strips shall be installed in strict accordance with the manufacturer's written instructions and recommendations. The ends of the form liner pattern shall be clogged and all form joints and edges shall be taped using 1/8-inch thick by 3/4-inch wide foam tape centered on the joints, then caulked in accordance with the manufacturer's recommendations each time forms are set. A representative of the manufacturer shall be present at the site to supervise the installation of the form liner for the entire project.

    b. Forms for smooth concrete shall be installed in such a manner that there will be no horizontal form joints, and the forms shall be aligned so that vertical joints occur only at "V-Groove" rustications. Form ties shall be spaced in a uniform pattern vertically and horizontally. Form ties shall be positioned in smooth concrete bands and in panels between "reveal" rustications, if any.

c. Beam and girder soffits shall be erected in accordance with ACI 117 and sufficiently braced, shored, and wedged to prevent deflection. Column sides shall be clamped in accordance with this specification with metal column clamps, spaced according to the manufacturer's directions.

B. Reshoring

1. During reshoring the concrete in beams, slabs, columns, or any other structural members shall not be loaded with combined dead and construction loads in excess of the loads permitted by the Engineer for the developed concrete compressive strength at the time of reshoring.

2. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

3. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise noted on the Contract Drawings.

4. For floors supporting shores under newly placed concrete, the original supporting shores or reshores shall be left in place. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under the floors supporting shores unless other locations are permitted or shown on the Contract Drawings.

5. In multi-story buildings reshoring shall be extended over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

C. Removal of Forms and Ties

1. Forms shall be removed in accordance with ACI 347 recommendations without damage to concrete and in a manner to ensure complete safety to the structure. Forms, form ties and bracing shall not be removed without specific permission of the Contractor's Registered Professional Engineer.

2. Top forms on sloping surfaces of concrete shall be removed as soon as removal operations will not allow the concrete to sag. Any needed repairs or treatment required on sloping surfaces shall be performed at once and shall be followed immediately with the specified curing.

3. Upon removal of forms, the Engineer shall be notified in order that a review of the newly stripped surfaces may be made before patching.

4. Wood forms for wall openings shall be loosened without causing damage to the concrete. The face of concrete shall not be pried against. Only wooden wedges shall be used.

5. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured in accordance with one of the methods specified in Section 03 30 00 - Cast-in-Place Concrete.

6. In general, forms shall not be removed until the concrete has hardened sufficiently to safely support its own load, plus any superimposed load that might be placed thereon. As a minimum the forms shall be left in place for length of time specified below. These times represent cumulative days, not necessarily consecutive, during which the air surrounding the concrete is above 50 degrees F.

	Min Time (days)	**Min Strength (psi)**
1. Curbs and Walks	2	1500
2. Columns	2	2000
3. Side forms for girders and beams	2	2000
4. Walls	2	2000
5. Bottom forms of slabs:		
a. Under 20 feet clear span	7	3000
b. Over 20 feet clear span	10	3500
6. Bottom forms of beams and girders:		
a. Under 10 feet clear span	7	3000
b. 10 to 20 feet clear span	14	3500
c. Over 20 feet clear span	21	4000

   a. These times shall be increased if the concrete temperature following placement is permitted to drop below 50 degrees F.

7. Care shall be taken in removing forms, wales, shorings, supports and form ties to avoid spalling or marring the concrete. Rubbed finish, if required,

and such patching as may be necessary shall be started immediately after removal.

D. Re-Use of Forms

1. Forms for re-use shall meet requirements for new forms with respect to effect on cast-in-place concrete appearance and structural stability.

2. Re-use of forms shall in no way delay or change the concrete placement schedule as compared to the schedule obtainable if all forms were new (in the case of wood forms) of if the total required forms were available (in the case of metal forms).

3. Formwork shall be cleaned and re-oiled prior to re-use. Plywood forms shall not be re-used if unused holes from form ties exist from a previous use. High density overlay plywood panels shall be thoroughly cleaned and lightly recoated before each additional use. Wood forms shall not be used more than three times.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection

1. During installation, the forms shall not be used as a storage platform nor as a working platform until the forms have been permanently fastened in position.

2. The surface of installed forms shall not be overloaded.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 03 21 00 - REINFORCING STEEL
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install all reinforcing steel as indicated on the Contract Drawings including all labor, materials, hardware, equipment, transportation, and services required for fabricating, cutting, bending, fastening and any special work and supplies necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this Section and needed for a complete installation as approved by the Engineer.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	11
2.04	Source Quality Control / Shop Tests	13
PART 3	EXECUTION	14
3.01	Examination / Preparation	14

3.02 Implementation 14
3.03 Field Testing / Quality Control 18
3.04 Startup / Demonstration 19
3.05 Adjusting / Protection / Cleanup.....19

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures
2. ACI 318 - Building Code Requirements for Reinforced Concrete
3. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary
4. ACI MNL-66 - ACI Detailing Manual
5. AWS D1.4 - Structural Welding Code - Reinforcing Steel
6. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement
7. ASTM A184 - Fabricated Deformed Steel Bar Mats for

			Concrete Reinforcement
8.	ASTM A185	-	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
9.	ASTM A 1064	-	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
10.	ASTM A496	-	Steel Wire, Deformed, for Concrete Reinforcement.
11.	ASTM A497	-	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
12.	ASTM A615	-	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
13.	ASTM A706	-	Low-Alloy Steel Deformed Bars for Concrete Reinforcement
14.	ASTM A767	-	Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
15.	ASTM A775	-	Epoxy-Coated Reinforcing Steel Bars.
16.	ASTM A996	-	Rail -Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
17.	ASTM C881	-	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
18.	CRSI DA4	-	Concrete Reinforcing Steel Institute Manual of Standard Practice
19.	ISO 14025	-	Environmental labels and declarations - Type III environmental declarations
20.	New York State Building Code (NYSBC)		

1.05 DESCRIPTION

A. Placing drawings showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories without reference to the project drawings

shall be submitted for approval. Approval shall be obtained from the Engineer before fabrication.

B. Details of concrete reinforcement not covered in the Contract shall be in accordance with ACI 315, ACI 318 and CRSI DA4.

C. When it is found necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement, conduits, or embedded items, a submittal showing the resulting arrangement of reinforcement shall be submitted to the Engineer for approval.

D. All reinforcement, at the time concrete is placed, shall be free of mud, oil or other materials that may adversely affect or reduce the bond. Reinforcement with rust, mill scale or a combination of both shall be considered satisfactory provided the minimum dimensions, weight and height of deformation of a hand-wire-brushed test specimen are not less than the applicable ASTM specification requirement.

E. Provide accurate templates for column dowels to secure their position and to ensure their proper placement in concrete, unless otherwise approved by the Engineer.

1. To obtain approval to place column dowels without using templates, the Contractor must submit:

    a. Request for such approval with details on how column dowels will be secured in their position; and

    b. Placing drawings as specified herein.

2. The Engineer reserves the right to grant approval to place column dowels without using templates based on review of the placing drawing submittal. The Engineer’s determination on use of templates will be final, and the Contractor shall abide by such determination.

F. All splices shall be as indicated on the Contract Documents unless otherwise permitted by the Engineer. Mechanical connections that provide a minimum of 125 percent of the yield strength of the reinforcing bars may be used when permitted by the Engineer.

1. Reinforcement coating shall be removed in the area of the mechanical connection, if so required by the connection manufacturer.

2. After installation of mechanical connections on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All external parts of mechanical connections used on coated bars, including steel splice

sleeves, bolts and nuts shall be coated with the same material used for repair of coating damage.

G. Temperature Reinforcing

1. Unless otherwise shown on the Contract Drawings or in the absence of the concrete temperature reinforcing being shown:

a. The minimum cross sectional area of horizontal and vertical concrete temperature reinforcing in walls shall be 0.0033 times the gross concrete area.

b. The minimum cross sectional area of temperature reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area.

2. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

1.06 QUALITY ASSURANCE

All reinforcement shall be supported and fastened before concrete is placed and shall be secured against displacement within the tolerances permitted in this Section.

1.07 SUBMITTALS

A. The Contractor shall submit placing drawings, Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not limited to:

1. Detailed placement and shop fabrication drawings, prepared in accordance with ACI 315 and ACI SP66 shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, layout, bending, assembly diagrams, bar schedules, spacing, lapping and splicing of the bars.

2. Certified copies of mill reports shall accompany all deliveries of reinforcing steel.

3. Description of the reinforcing steel manufacturer's marking pattern.

4. Description of proposed supports for each type of reinforcing.

5. Description of reinforcing weld locations and weld procedures.

B. The Contractor shall also include the following:

1. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.

2. Request to use splices not shown on the Contract Drawings.

3. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.

4. Request for placement of column dowels without the use of templates.

5. Request and procedure to field bend or straighten partially embedded reinforcing.

C. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor’s approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor’s New Materials Sustainable Implementation Plan.

D. Hollow-Core Anchors

1. The Contractor shall submit the following:

a. Report of installed tensioning forces in all hollow-core anchors.

b. Report of testing results as defined in Paragraph 3.02 Article F.3.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

B. Coating damage zinc-coated (galvanized) reinforcing bars due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

C. Equipment for handling epoxy-coated reinforcing bars shall have protected contact areas. Bundles of coated bars shall be lifted at multiple pickup points to prevent bar-to-bar abrasion from sags in the bundles. Coated bars or bundles of coated bars shall not be dropped or dragged. Coated bars shall be stored on protective cribbing. Coating damage due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

D. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

E. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

F. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be re-inspected and if necessary re-cleaned.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow-Core Anchors

1. The hollow-core anchors shown on the Contract Drawings shall consist of:

a. Williams Form Engineering Corp. R1H Spin-Lock High Grade Hollow-Core Anchor. The length of Hollow-Core Anchor bars and the length that is threaded shall be selected to suit field application.

B. Dowel Adhesive System

1. The adhesive system shall consist of:

a. Two-component, high strength, moisture tolerant, epoxy adhesive.

b. Mixed epoxy resin adhesive shall conform to ASTM C881.

c. Acceptable Manufacturers include:

1) Hilti HIT-RE 500 V3, www.hilti.com

2) Simpson SET 3G, www.simpsonanchors.com

3) Or approved equal

2.02 MATERIALS / EQUIPMENT

A. Reinforcement

1. Reinforcing Steel:

a. All reinforcing steel shall be deformed except spirals and welded wire fabric, which may be plain bars. Reinforcement shall be the grades required by the Contract Documents and shall conform to one of the following specifications:

1) ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

2) ASTM A996 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

3) (Not Used).

4) ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

5) Wire or wire fabric with a specified yield strength fy exceeding 60,000 psi shall have the stress fy corresponding to a strain of 0.35 percent.

6) Reinforcing steel shall conform to the applicable requirements of Sections 03 30 00 – Cast-in-Place Concrete and the New York State Building Code.

2. Coated Reinforcing Bars:

a. Furnish and install coated reinforcing bars for structural concrete Work wherever shown and/or noted on the Contract Drawings.

b. Reinforcing bars shall be zinc-coated (galvanized) or epoxy-coated. The reinforcing bars to be coated shall conform to the requirements of this Section.

1) Zinc-Coated (Galvanized) Reinforcing Bars: Zinc-coated (galvanized) reinforcing bars shall conform to ASTM

A767. Supplementary requirements S1 and S2 shall apply when fabrication after galvanization includes cutting and bending. Supplementary requirement S2 shall apply when fabrication after galvanization includes only bending. Repair of damaged zinc coating when required shall be made with a zinc-rich formulation conforming to ASTM A767. Repair shall be done in accordance with the material manufacturer's recommendations.

2) Epoxy-Coated Reinforcing Bars: Epoxy-coated reinforcing bars shall conform to ASTM A775. Coating damaged due to shipping, handling and placing need not be repaired in cases where the damaged area is 0.1 square inches or smaller. Repair damaged areas larger than 0.1 square inches with patching material conforming to ASTM A775 and in accordance with the material manufacturer's recommendations. The maximum amount of damage including repaired and unrepaired areas shall not exceed 2 percent of the surface area of each bar. Fading of the coating color will not be cause for rejection of epoxy-coated reinforcement.

3. Bar Mats:

a. Furnish and install bar mats for structural concrete Work where shown and/or noted on the Contract Drawings.

b. Bar mats shall be of the clipped type conforming to ASTM A184 and shall be fabricated from reinforcing bars that conform to the requirements of this Section.

1) Bar mats shall be fabricated from zinc-coated (galvanized) reinforcing bars. Metal clips shall be zinc-coated (galvanized). Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

2) Bar mats shall be fabricated from epoxy-coated reinforcing bars. Metal clips shall be epoxy-coated. Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

4. Wire:

a. Wire shall be smooth or deformed wire as indicated in the Contract Documents.

1) Smooth wire shall conform to ASTM A82.

2) Deformed wire shall conform to ASTM A496, size D4 and larger.

5. Welded Wire Fabric:

a. Welded wire fabric shall be fabricated from smooth or deformed wire and shall conform to the wire size and wire spacing required or indicated on the Contract Documents. Welded wire fabric shall conform to one of the following specifications:

1) Plain wire fabric ASTM 1064, except welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

2) Deformed wire fabric ASTM A497, except welded intersections shall be spaced not farther apart than 16 inches in the direction of the principal reinforcement.

6. Spirals:

a. As indicated in the Contract Documents, spirals shall be fabricated from reinforcing bars or wire.

B. Wire Bar Supports

1. Unless noted otherwise on the Contract Drawings, wire bar supports shall be in accordance with Class 1, maximum protection or Class 2, moderate protection in Chapter 3 of CRSI DA4.

C. Coated Wire Reinforcement Supports

1. Epoxy-Coated Reinforcement:

a. Use wire reinforcement supports coated with dielectric material including epoxy or other polymer for a minimum distance of 2 inches from the point of contact with epoxy-coated reinforcement.

2. Zinc-Coated Reinforcement:

a. Use galvanized wire reinforcements supports or wire reinforcement supports coated with dielectric material with zinc-coated reinforcement.

D. Precast Concrete Reinforcement Supports

1. Concrete supports used for supporting reinforcement shall be not less than 4 inches square having a compressive strength equal to or greater than the specified compressive strength of the concrete being placed.

E. Drilled Dowel Adhesive System – Epoxy Adhesive (Construction in Dry Conditions)

1. Where shown on the Contract Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component, high strength, moisture tolerant adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

2. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar, unless noted otherwise on the Contract Drawings.

3. The adhesive system shall be as specified in this Section and installed in accordance with manufacturer’s recommendations.

4. The Engineer's approval is required for use of this system in locations other than those shown on the Contract Drawings.

F. Hollow-Core Anchor Adhesive System – Cementitious Grout (Construction in Dry and Underwater Conditions)

1. Where shown on the Contract Drawings, drilled hollow-core anchors anchored into hardened concrete at the HLRT shall use a cementitious grout mix as specified in Section 03 60 00 – Grouting.

2. The embedment depth of the bar shall be per manufacturer's recommendations, unless noted otherwise on the Contract Drawings.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Welding

1. When required or permitted, all welding of reinforcing bars shall conform to ANSI/AWS D1.4. Unless otherwise permitted by the Engineer, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and any supplementary requirements specified by the Supervising Engineer for Concrete Construction for the particular application.

3. After completion of welding on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All welds and all steel splice members when used to splice bars shall be coated with the same material used for repair of coating damage.

B. Fabrication

1. All reinforcement shall be bent cold unless otherwise permitted by the Engineer.

2. Fabricating and Placing Tolerances:

3. Reinforcing bars shall be fabricated in accordance with the standard fabricating tolerances in Figures 4 and 5 of ACI 315. Tolerances shall not permit a reduction in cover.

4. Placing Tolerances for Reinforcement:

Item	Tolerances, Inches
1. Clear distance:	
a. To formed soffit	-1/4
b. To other formed surfaces	±1/4
2. Minimum spacing between bars:	-1/4
3. Clear distance from unformed surface to top reinforcement:	
a. Members 8 inches deep or less	±1/4
b. Members more than 8 inches deep but less than 24 inches deep	-1/4, +1/2
c. Members 24 inches deep or greater	1/4, +1
4. Uniform spacing of bars, but the required number of bars shall not be reduced:	±2

Item	Tolerances, Inches
5. Uniform spacing of stirrups and ties, but the number of stirrups and ties shall not be reduced:	±1
6. Longitudinal locations of bends◦ and ends of reinforcement: a. General b. Discontinuous ends of members	 ±2 ±1/2
7. Length of bar laps:	1-1/2
8. Embedded length: a. For bar sizes No. 3 through 11 b. For bar sizes No. 14 and 18	 -1 -2

5. When it is necessary to move bars to avoid interference with other reinforcement, conduits or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to approval of the Engineer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Testing

1. The Contractor shall provide samples from each load of reinforcing steel delivered in a quantity as directed by the Engineer for testing.

2. In addition, the Contractor shall provide samples of each type of welded splice used in the work in a quantity and of dimensions as directed by the Engineer for testing. At the discretion of the Engineer, radiographic testing of direct butt-welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The Contractor shall repair any weld which fails to meet the requirements of AWS D1.4.

3. The testing will be performed by QA/QC consultant employed and paid by DEP to ensure that reinforcing steel and welded splice comply with the technical requirements of the Contract.

4. The Contractor shall be charged by DEP for the cost of any additional tests and investigation on work performed which does not meet the specifications.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Placing

1. Minimum concrete cover for reinforcement, except for extremely corrosive atmosphere, other severe exposures or fire protection shall be as follows unless indicated otherwise on the Contract Documents.

2. Minimum Concrete Cover for Reinforcement shall be in accordance with the Contract Drawings (Reference Drawing S001).

3. For bundled bars, minimum concrete cover shall be equal to the equivalent diameter of the bundles but need not be greater than 2 inches; except for concrete deposited against and permanently in contact with ground, minimum cover shall be 3 inches. The equivalent diameter of the bundle shall be based on a single bar of a diameter derived from the equivalent total area.

4. Unless otherwise indicated on the Contract Documents, reinforcement supported from the ground or mud mat shall rest on precast concrete blocks not less than 4 inches square and having a compressive strength equal to or greater than the specific compressive strength of the concrete being placed. Other means of support may be used if accepted by the Engineer.

5. Reinforcement supported from formwork shall rest on bar supports made of concrete, metal, plastic or other acceptable materials. Where the concrete surface will be exposed to the weather in the finished structure, the portions of all bar supports within 1/2 inch of the concrete surface shall be non-corrosive or protected against corrosion.

6. Zinc-coated (galvanized) reinforcing bars supported from formwork shall rest on galvanized wire bar supports coated with dielectric material or on bar supports made of dielectric material or other acceptable materials. All other reinforcement and embedded steel items in contact with galvanized reinforcing bars or within a minimum clear distance of 2 inches from

galvanized reinforcing bars unless otherwise required or permitted shall be galvanized.

7. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy coated. In walls having epoxy-coated reinforcing bars, spreader bars, where specified, shall be epoxy coated. Proprietary combination bar clips and spreaders used in wall with epoxy-coated reinforcing bars shall be made of corrosion-resistant material or coated with dielectric material.

8. Zinc-coated (galvanized) reinforcing bars shall be fastened with zinc-coated tie wire or non-metallic-coated tie wire or other acceptable materials.

9. Epoxy-coated reinforcing bars shall be fastened with nylon-epoxy or plastic-coated tie wire; or other acceptable materials.

10. Welded wire fabric for slabs on grade shall extend to within 2 inches of the concrete edge. Welded wire fabric may extend through the contraction joints. Welded wire fabric shall be adequately supported during placing of concrete to assure proper positioning in the slab.

11. Bending or straightening of bars partially embedded in concrete shall not be permitted except when specifically approved by the Engineer. Bending and preheating shall be in accordance with the requirements of this Section.

B. Bending of Bars

1. Minimum Inside Bend Diameters:

a. The minimum inside bend diameters shall conform to the following requirements unless otherwise permitted by the Engineer.

Bar Size	Minimum Diameter
No. 3 through 8	6 bar diameters
No. 9, 10, 11	8 bar diameters
No. 14 and 18	10 bar diameters

2. The beginning of the bend shall not be closer to the concrete surface than the minimum diameter of bend. Preheating, if required, shall be in accordance with the requirements of the Section. The following requirements shall be adhered to for individual bar sizes:

Bar Size	Bend Requirements
No. 3 through No. 5	Bars may be cold bent the first time. Cold bend bars only when temperature is above 32 degrees Fahrenheit. Preheating is required for subsequent straightening or bending.
No. 6 and larger	Preheating is required.

3. When zinc-coated (galvanized) or epoxy-coated reinforcing bars are field bent, coating damage shall be repaired in accordance with the applicable requirements of the Section.

C. Preheating of Bars

1. Preheating prior to bending or straightening, when required, shall be in accordance with the following requirements:

   a. The preheat shall be applied to a length of bar equal to at least 5 bar diameters each way from the center of the bend except that preheat shall not extend below the surface of the concrete. The temperature of the bar at the concrete interface shall not exceed 500 degrees Fahrenheit.

   b. The preheat temperature shall be 1100 to 1200 degrees Fahrenheit.

   c. The preheat temperature shall be maintained until bending or straightening is complete.

   d. The preheat temperature shall be measured by temperature measurement crayons, contact pyrometer or other acceptable method.

   e. Heated bars shall not be artificially cooled until the material temperature is less than 600 degrees Fahrenheit.

2. Preheating may be applied by any method which does not harm the bar material or cause damage to the concrete.

D. Splicing

1. Reinforcing bar splices shall only be used at locations shown on the Contract Drawings. When it is necessary to splice reinforcing at points other than where shown, the character of the splice shall be approved by the Engineer.

2. The length of lap for reinforcing bars, unless otherwise shown on the Contract Drawings shall be in accordance with ACI 318 for a class B splice.

3. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

4. Mechanical and welded splices shall be used only where shown on the Contract Drawings or when approved by the Engineer.

5. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Contract Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an 0-ring seal.

E. Dowel Adhesive System Installation

1. The installation of the dowels shall be done in strict conformance with the manufacturer's recommendations. The dowels shall be supported in the correct position until the adhesive sets and gains enough strength to prevent any dislocation.

2. At least 25 percent of the dowels to be installed shall be proof tested to 5,000 pounds and not exceed allowable load as specified by the manufacturer of the adhesive-injection system.

3. If the dowels are required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.

F. Hollow-Core Anchor Installation

1. Install hollow-core anchors in accordance with the construction sequencing as shown on the Contract Drawings.

2. Installation of the hollow-core anchors shall be in strict conformance with the manufacturer's recommendations and include the use of an antiwashout admixture during placement underwater as specified in Section 03 60 00 – Grouting.

3. At least 25 percent of the anchors to be installed shall be proof tested to 5,000 pounds and in accordance with manufacturer’s recommendations and not exceed allowable load as specified by the manufacturer of the hollow-core anchor system.

G. Miscellaneous Installation Requirements

1. Exposed Reinforcement:

a. Reinforcement left exposed for the bonding of future construction shall be effectively protected from corrosion by encasement in cement mortar or by other temporary covering as approved by the Engineer.

2. Field Cutting of Reinforcement:

a. Reinforcement shall not be cut in the field except when specifically permitted by the Engineer in writing.

3. Reinforcement Through Expansion Joint:

a. Reinforcement or other embedded metal items bonded to the concrete shall not be continuous through any joint intended as an expansion joint. Dowels bonded on only one side of a joint and waterstops may extend through the joint.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection

1. No concrete shall be deposited until the Supervising Engineer for Concrete Construction or his approved representative has inspected the placing of the reinforcing steel and has given permission to place the concrete. Concrete placed in violation of this provision may be rejected with subsequent removal by the Contractor.

2. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.

3. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of providing all labor, materials, equipment, supervising, testing and incidentals necessary to furnish and install cast-in-place concrete as indicated on the Contract Drawings and as specified herein.

B. Work includes producing concrete consisting of Portland cement, fine and coarse aggregate, water and approved admixtures; proportioned, mixed, transported, placed, finished and cured as specified. Work shall also include:

1. Providing openings in concrete as required to accommodate Work under this and other Sections.

2. Building into the concrete all items such as sleeves, frames, anchor bolts and inserts required to accommodate the Work.

C. This Section covers cast-in-place structural concrete for use in buildings and structures and miscellaneous cast-in-place concrete.

D. This Section covers the requirements of Executive Order 23 for low carbon concrete and clean construction practices.

E. Concrete mix proportioning shall conform to the New York State Building Code (NYSBC) proportioning requirements as well as to these specifications.

F. The following index of this Section is presented for convenience:

G.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	8
1.06	Quality Assurance	10
1.07	Submittals	14
1.08	Delivery, Storage, and Handling	19
1.09	Concrete Work Mock-Ups and Test Placement	20
1.10	Spare Parts, Special Tools, and Supplies	20
1.11	Warranty	20
PART 2	PRODUCTS	20
2.01	Manufacturers	20
2.02	Materials / Equipment	23
2.03	Fabrication / Assembling / Finishes	33
2.04	Source Quality Control / Shop Tests	37
PART 3	EXECUTION	37
3.01	Examination / Preparation	37
3.02	Implementation	39
3.03	Field Testing / Quality Control	65

3.04 Startup / Demonstration 82
3.05 Adjusting / Protection / Cleanup.....82

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 - Work Restrictions

B. Section 01 35 00 - Diving Services

C. Section 01 35 27 - Environmental, Health and Safety Requirements

D. Section 01 35 63.01 - Sustainability Requirements

E. Section 01 74 20 - Construction Waste Management

F. Section 02 68 00 - Control and Diversion of Water

G. Section 03 10 00 - Concrete Forming and Accessories

H. Section 03 21 00 - Reinforcing Steel

I. Section 03 32 00 - Joints in Concrete

J. Section 03 35 00 - Concrete Finishing

K. Section 03 60 00 - Grouting

L. Section 31 25 10 - Dust, Soil Erosion and Sedimentation Control

M. Section 31 23 23 - Fill

N. Section 31 74 22 - Tunnel Backfilling

1.04 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M 182 Specification for Burlap Cloth Made From Jute or Kenaf and Cotton Mats

2. AASHTO TP 23 Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying

3. AASHTO T 26 Standard Method of Test for Quality of Water to be Used in Concrete

4. AASHTO T 227 Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

5. AASHTO T 318 Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying

B. American Concrete Institute (ACI):

1. ACI CT-18 ACI Concrete Terminology
2. ACI 117 Specification for Tolerances for Concrete Construction and Materials and Commentary
3. ACI 121 Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
4. ACI 207.1R Guide to Mass Concrete
5. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
6. ACI 211.5R Guide for Submittal of Concrete Proportions
7. ACI 213R Guide for Structural Lightweight-Aggregate Concrete
8. ACI 214R Guide to Evaluation of Strength Test Results of Concrete
9. ACI 222R Protection of Metals in Concrete Against Corrosion
10. ACI 301 Specifications for Concrete Construction
11. ACI 302.1R Guide to Concrete Floor and Slab Construction
12. ACI 303.1 Standard Specification for Cast-in-Place Architectural Concrete
13. ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete
14. ACI 305R Guide to Hot Weather Concreting
15. ACI 306R Guide to Cold Weather Concreting
16. ACI 308.1 Specification for Curing Concrete
17. ACI 309R Guide for Consolidation of Concrete
18. ACI 311.4R Guide for Concrete Inspection
19. ACI 318 Building Code Requirements for Structural Concrete and Commentary on Building Code Requirements for Structural Concrete
20. ACI 347R Guide to Formwork for Concrete
21. ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary
22. ACI 506R Guide to Shotcrete
23. ACI 506.2 Specification for Shotcrete
24. ACI MNL-2 ACI Manual of Concrete Inspection
25. ACI MNL-15 Field Reference Manual: Standard Specifications for Structural Concrete ACI 301 with selected ACI references.

C. American National Standards Institute/National Science Foundation (ANSI/NSF) Standard 61 - “Drinking Water System Components - Health Effect”

D. American Society for Testing and Materials (ASTM)

1. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C 33 Standard Specification for Concrete Aggregates
3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
5. ASTM C 42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C 78 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third Point Loading)
7. ASTM C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
8. ASTM C 94 Standard Specification for Ready-Mixed Concrete
9. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
10. ASTM C 114 Standard Test Methods for Chemical Analysis of Hydraulic Cements
11. ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
12. ASTM C 138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
13. ASTM C 143 Standard Test Method for Slump of Hydraulic Cement Concrete
14. ASTM C 150 Standard Specification for Portland Cement
15. ASTM C 156 Standard Test Method for Water Loss [from a Mortar Specimen] through Liquid Membrane-Forming Curing Compounds for Concrete
16. ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete
17. ASTM C 171 Standard Specification for Sheet Materials for Curing Concrete
18. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete
19. ASTM C 173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
20. ASTM C 174 Standard Test Methods for Measuring Thickness of Concrete Elements using Drilled Concrete Cores

21. ASTM C 191 Standard Test Methods for Time Setting of Hydraulic Cement by Vicat Needle
22. ASTM C 192 Standard Practice for Making and Curing Test Specimens in the Laboratory
23. ASTM C 227 Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations
24. ASTM C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
25. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete
26. ASTM C 289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
27. ASTM C 295 Standard Guide for Petrographic Examination of Aggregates for Concrete
28. ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
29. ASTM C 311 Test Method for Sampling & Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
30. ASTM C 330 Standard Specification for Lightweight Aggregates for Structural Concrete
31. ASTM C 387 Standard Specification for Packaged, Dry Combined Materials for Mortar and Concrete and High Strength Mortar
32. ASTM C 470 Standard Specification for Molds for Forming Concrete Test Cylinders Vertically
33. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete
34. ASTM C 566 Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
35. ASTM C 567 Standard Test Method for Density Structural Lightweight Concrete
36. ASTM C 595 Standard Specification for Blended Hydraulic Cements
37. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
38. ASTM C845 Standard Specification for Expansive Hydraulic Cement
39. ASTM C 856 Standard Practice for Petrographic Examination of Hardened Concrete
40. ASTM C 881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

41. ASTM C 882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
42. ASTM C 979 Standard Specification for Pigments for Integrally Colored Concrete
43. ASTM C 989 Standard Specification for Slag Cement for Use in Concrete and Mortars
44. ASTM C 1064 Standard Test Method for Temperature of Freshly Hydraulic-Cement Concrete
45. ASTM C 1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
46. ASTM C 1141 Specification for Admixtures for Shotcrete
47. ASTM C 1152 Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete
48. ASTM C 1157 Standard Performance Specification for Hydraulic Cement
49. ASTM C 1218 Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
50. ASTM C 1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
51. ASTM C 1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
52. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete due to Alkali-Silica Reaction
53. ASTM C 1398 Test Method for Laboratory Determination of time of Setting of Hydraulic-Cement Mortars Containing Additives for Shotcrete by the Use of Gillmore Needles
54. ASTM C 1480 Packaged, Pre-Blended, Dry, Combined Materials for Use in Wet or Dry Shotcrete Application
55. ASTM C 1567 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
56. ASTM C1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
57. ASTM C1778 Standard Guide for Reducing Risk of Deleterious Alkaia-Aggregate Reaction in Concrete
58. ASTM D 3665 Standard Practice for Random Sampling of Construction Materials

59. ASTM D 4791 Test Method for Flat Particles, Elongated Particle, or Flat and Elongated Particles in Coarse Aggregate

60. ASTM E 329 Standard Specification for Agencies Engaged in the Construction Inspection Testing of Special Inspection

E. The Building Code of the City of New York (NYCBC)

F. The Building Code of the State of New York (NYSBC)

G. Concrete Plant Manufacturer's Bureau (CPMB) - "Concrete Plant Standards."

H. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI – "Manual of Standard Practice"

2. CRSI – "Placing Reinforcing Bars"

I. International Organization for Standardization (ISO)

1. ISO Series 14025 Type III - Environmental labels and declarations — Type III environmental declarations

J. National Ready Mixed Concrete Association (NRMCA)

K. New York State Department of Transportation (NYS DOT) - Standard Specifications

L. Portland Cement Association (PCA) – "The Design and Control of Concrete Mixtures"

M. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

2. Inspection Requirements – Special Inspections requirements of the New York City Building Code as defined in NYCBC 1705.3 shall apply to all applicable materials and construction.

3. [Not Used].

4. Normal Weight Concrete - Concrete for which density is not a controlling attribute, made with aggregates of types covered by ASTM C 33.

5. Supervising Engineer for Concrete Construction - Professional Engineer designated by the Commissioner, who will be responsible for coordination of Special Inspections and Buildings Form TR1: Technical Report Statement of Responsibility. The Supervising Engineer for Concrete Construction may or may not be the Resident Engineer. The Supervising Engineer for Concrete Construction shall undertake all responsibilities outlined in Article 28 and NYCBC 1705.3 Special Inspections of the New York Building Code.

6. Other technical words and terms used in this Section are defined in ACI CT-18.

1.05 DESCRIPTION

A. Classes of Concrete:

1. Refer to Table 2 at the end of this Section for a summary of the various concrete mixes pertaining to the constructed features included in the Work and the base classes of concrete specified herein. Each concrete mix design must be submitted for approval in accordance with Article 1.07 Submittals.

2. Class 25 - use for the tremie concrete pad foundation of the High Level Release Tower (HLRT).

3. Class 40M - use for mass concrete at the Gated Spillway notch, including the Stepped Downstream Face and reconstructed Spillway Crest. The form liners and coloring previously used on the reconstructed Spillway during CAT-212B construction shall be replicated to provide a relatively seamless appearance with the rest of the Spillway face. Class 40M mix design requirements shall be as provided in this Section.

4. Class 40P - use for pumpable concrete fill of the High Level Outlet (HLO) Tunnel through dam in annulus between Tunnel wall and HLO pipe. For equipment, installation, execution, and testing requirements of the 40P pumpable concrete fill, see Section 31 74 22 – Tunnel Backfilling.

5. Class 45 - use for all concrete unless indicated otherwise. Class 45 concrete work includes:

a. Class 45 concrete with a corrosion inhibitor and crystalline waterproofing in the mix design, as specified herein or on the Contract Drawings.

b. Spillway Crest Vanes.

c. HLRT foundation base slab (underwater tremie concrete).

d. HLRT wedge wall at dam upstream face (underwater tremie concrete).

e. HLRT superstructure, interior operating floor slab, walls, roof slab, and parapet.

f. Perimeter of new doorway between Upper Gate Chamber (UGC) and HLRT, and resurfacing of related floor slab.

g. Closure of hatch in UGC roof.

h. Access stairway modifications at Monolith 18 (M18) to spillway crest.

i. New access stairway located along the Spillway West Training Wall from Spillway crest to HLO Outfall Structure.

j. HLO Outfall Structure walls and cover slab.

k. Encasements related to installation of instrumentation at End Sill and HH-82.

B. Integrally Colored Concrete Work – Select concrete shall be colored per the requirements of this Section. Colored concrete will be required for the following Exterior Exposed-to-View Work:

1. Spillway Crest and Downstream Steps.
2. Spillway Crest Vanes.
3. Outfall Structure walls and cover slab.
4. Exposed-to-View concrete placements of the HLRT.
5. M18/Spillway Crest Access Stairway.
6. HLO Access Stairway along Spillway West Training Wall.

C. Work in Connection with other disciplines:

1. All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be placed prior to concreting. No concrete shall be deposited until the Resident Engineer or his authorized representative has inspected the placement of the embedded items and the reinforcing bars and has given his permission to place the concrete.
2. All Work related to the concrete or must be supported by it, shall be coordinated with the work of this Section, including but not limited to the introduction or furnishing of embedded items prior to concrete placement.
3. Electrical conduits, junction boxes or pipes embedded in concrete shall be placed in accordance with the Contract Drawings and all requirements of the New York City Building Code. The Contractor shall protect such installations to the extent that they are not displaced or damaged during concrete placement.
4. Openings in slabs shall be provided for pipes, conduits and the like required for the work of others where indicated on the Contract Drawings or for which directions are given prior to placing concrete. When work of others is completed, the excess part of the respective openings shall be completely closed up to the pipe sleeve and/or inserts to match the adjoining work.
5. Sleeves for miscellaneous metalwork, castings, pipes and anchors furnished shall be set true and to proper alignment in the concrete as indicated on the Contract Drawings or required by the manufacturer’s templates.
6. Voids in embedments shall be filled temporarily with readily removable material to prevent entry of concrete into the void.

D. Underwater Concreting:

1. Contractor shall perform underwater concreting work at the locations indicated on the drawings and in accordance with the underwater concreting provisions of this Section.

2. Concrete placements shown on the Drawings at all other locations shall be placed in the dry.

1.06 QUALITY ASSURANCE

A. General:

1. Work performed under this Section shall comply with the applicable provisions and recommendations in Article 1.04 - References of this Section.

2. The Contractor shall employ, at its own expense, a testing laboratory experienced in the design and testing of concrete materials and mixes. This laboratory shall be responsible for all concrete mix design and trial batch testing.

   a. Unless otherwise approved, all mix designs shall be run in the presence of DEP designated personnel.

3. Testing agencies that perform testing services on concrete shall meet the requirements of ASTM E 329 and be licensed by the New York City Department of Buildings.

4. Testing laboratory shall have been inspected within the last 2 years by the Cement and Concrete Reference Laboratory (CCRL) of the National Institute of Standards and Technology for testing concrete aggregates and for the preparation and testing of concrete trial batches with or without admixtures. The laboratory shall provide documentation indicating how any deficiencies in the latest CCRL inspection report have been corrected.

5. Testing and inspection shall be conducted in accordance with the requirements of ASTM C 1077 and other applicable standards.

6. Prior to performing any Work, the qualifications of the proposed testing agency shall be submitted for review and acceptance by the DEP.

7. Tests of concrete required by this Section shall be made by an ACI Concrete Field Testing Technician Grade 1 or equivalent. Equivalent certification programs shall include requirements for written and performance examinations as stipulated in ACI publication CP1.

8. Prior to approval, all testing of proposed materials and mix designs including trial batch and shrinkage testing shall be at the Contractor's expense.

9. Concrete materials and operations will be tested and inspected by the Supervising Engineer for Concrete Construction or his authorized representative as the work progresses. Failure to detect defective work or material shall not in any way prevent later rejection when a defect is discovered nor shall it obligate the Engineer for final acceptance.

10. Materials and installed Work may require testing and retesting, as directed by Engineer, at any time during the progress of the Work. Contractor shall

allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at Owner's expense, including the retesting of rejected materials and installed Work, shall be done at Contractor's expense.

B. Laboratory Trial Batch:

1. Each concrete mix specified shall be verified by a laboratory trial batch, unless indicated otherwise. Each trial batch shall also be witnessed by a DEP representative. Provide at least 2 weeks' notice prior to performing the laboratory trial batching and testing to allow DEP to coordinate observation of the batching and testing program.

2. Each trial batch shall be reported on DEP's Mix Design Submittal (MDS) forms and shall include the following testing:

   a. Aggregate gradation for fine and coarse aggregates.

   b. Combined aggregate gradation including total percentage of each aggregate size retained on each sieve.

   c. Fly ash testing to verify meeting specified properties, unless certification by an independent testing laboratory is provided by the fly ash supplier.

   d. Slump.

   e. Air content.

   f. Compressive strength tests in accordance with Article 1.06, Paragraph B.4 based on 3 cylinders tested at 7 days and 3 cylinders tested at 28 days (6 cylinders minimum.). If the specified strength age in Table 1 is 56 or 90 days, then an additional 3 cylinders shall be tested at 56 or 90 days in accordance with Table 1 for a total of 9 cylinders tested.

   g. Shrinkage test where required and as specified herein.

3. Each trial batch shall provide the following information:

   a. Project identification name and number.

      1) Specified strength f'c.

      2) Name of the concrete producer supplying materials.

      3) Name of the Design Trial Lab.

   b. Date of trial.

   c. Complete identification of aggregate source of supply.

   d. Tests of aggregates for compliance with specified requirements.

   e. Scale weight of each aggregate.

   f. Absorbed water in each aggregate.

g. Brand, type and composition of cementitious materials.

h. Brand, type and amount of each admixture.

i. Amounts of water used in trial mixes.

j. Proportions of each material per cubic yard.

k. Gross weight and yield per cubic yard of trial mixtures.

l. Measured slump.

m. Measured air content.

n. Shrinkage test results where required and as specified herein.

o. A minimum of three (3) trial runs with different water/cement ratios shall be performed for each mix design proposed.

p. All compressive strength test results and all graphs made in accordance with Article 1.06, Paragraph B.4.

4. Trial mix proportions and consistencies suitable for the work shall be selected as recommended in ACI 211.1 and meeting all the requirements of these specifications, using at least three different water-cementitious ratios for each class of concrete, including colored concrete where applicable, which will produce a range of strengths encompassing those required for the work. Trial mixes shall be designed to produce a slump equal to the maximum permitted, and for air-entrained concrete, the maximum allowable air content. The temperature of concrete used in trial batches shall be reported. Material used in the trial mixes shall be from the same source as is proposed for use in the concrete for this Contract including admixtures and color additives, if applicable.

5. For each water-cementitious ratio, at least three compression test cylinders for each test age shall be made and cured in accordance with ASTM C192. They shall be tested for strength at 7 and 28 days (and at 56 or 90 days, if applicable, based on the age at the specified strength indicated in Table 1 at the end of this section), in accordance with ASTM C39. From the results of these tests a curve shall be plotted showing the relationship between the water-cementitious ratio and the compressive strength at the specified age. From this curve, the water-cementitious ratio to be used in the concrete shall be selected to produce the minimum strength required for mix design by Table 1. The cementitious content and mixture proportions to be used shall be such that this water-cementitious ratio is not exceeded when slump is the maximum permitted, nor shall the minimum water-cementitious ratio specified in Table 1 be exceeded, whichever is lower. Control in the field shall be based upon maintenance of proper water-cementitious ratio, cementitious content, slump, compressive strength and air content. Design of trial mixes and testing shall be performed at an independent laboratory employed by the Contractor and approved by the Engineer. Reports shall include the name of the contract, contract number and shall be certified

correct and accurate, including date of certification, by an authorized representative of lab.

6. On the day of the trial test, the laboratory shall provide to the DEP witness a 1-2 lb. neat cement sample for delivery to the DEP Laboratory for chemical composition analysis, for fly ash and slag and cement.

C. Shrinkage Test:

1. Drying shrinkage tests, as specified herein, shall be performed with every trial batch test.

2. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10 inches, fabricated, cured, dried and measured in accordance with ASTM C 157 modified as follows: Specimens shall be removed from molds at an age of 23 $\pm$1 hours after trial batching, shall be placed immediately in water at 70 degrees F $\pm$3 degrees F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F $\pm$3 degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 days. This length at age 7 days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F $\pm$3 degrees F and 50 percent $\pm$4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21, and 28 days of drying after initial 7 days of moist curing.

3. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004-inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be as specified in Part 2, herein.

D. Quality Assurance for Exposed-to-View Concrete Work:

1. For quality control requirements see Section 03 35 00 – Concrete Finishing. Requirements shall include the cast-in-place concrete subcontractor to be approved by the Architect/Engineer, assignment of a Quality Control Technician, and a Pre-Construction Meeting.

2. Casting criteria for the Mock-up is specified in Section 03 10 00 – Concrete Forming and Accessories.

E. Quality Assurance for Underwater Concrete Work:

1. Prior to concrete placement, make necessary arrangements to assure the uninterrupted delivery of concrete so that there will not be any unintended cold joints in the tremie concrete pad, foundation base slab, or wedge wall.

2. Arrange for access and accommodation for divers to inspect the work during placement of tremie concrete.

3. The concrete will be considered defective if at any time during concrete placement, the tremie line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level or it is found that the tremie tube is not watertight. In such case, remove the concrete and reconstruct the slabs or wall at no additional cost to DEP.

4. The finished top surface of the tremie concrete pad shall not exceed the maximum elevation shown on the Contract Drawings.

5. After completion of underwater concrete placement of the HLRT tremie pad, perform a bathymetric survey of the concrete tremie pad finished grade, plus 10 feet horizontally in each direction. The survey shall be accurate to 0.1-foot (i.e., +/-0.05 feet) and performed under the observation and/or direction of the Engineer.

6. Contractor shall not place the stay in place slab form until the Engineer has assessed and approved both the bathymetric survey and the Contractor's plan for adjusting (leveling) the stay in place form and for forming the annulus between the stay in place form and the surface of the tremie concrete to prevent loss of the slab concrete during its subsequent placement.

1.07 SUBMITTALS

A. General:

1. A new mix design shall be submitted to the Engineer for approval. Prior to changing the brand, type, size or source of cementitious materials, aggregates, water, ice or admixtures, new historical field strength test data, data from new trial mixtures or evidence which indicates that the change will not adversely affect the relevant properties of the concrete shall be submitted. Proposed mix proportions and all related data, in a format acceptable to the Engineer, shall be submitted to the Engineer for review six (6) weeks before the start of any concreting operations. The complete mix design shall include all components of concrete, including admixtures. Mix designs shall be prepared, signed and sealed by a Professional Engineer licensed in the State of New York.

2. Materials, equipment and aggregates approved by the Materials Bureau of the New York State Department of Transportation (NYSDOT), in the most recent NYSDOT approved lists mentioned below, are acceptable for use without a detailed submission. Submittal is required stating the particular

material, equipment or aggregate source to be used with approval identification number, and/or page number.

a. Materials and Equipment NYSDOT Approved Materials List

b. Approved List Sources of Fine and Coarse Aggregates

c. No aggregates noted in the ASR Flag list or high A.I.R. Content as noted on the NYSDOT List of Approved Aggregate Sources shall be considered or submitted for concrete mix use.

3. Submit Safety Data Sheets (SDS) for all materials used in concrete.

4. Submit all Personnel Qualifications as required in this Section.

B. Certifications:

1. All materials used in the manufacture of concrete shall be accompanied by a certificate from the manufacturer or fabricator or supplier indicating test results of current production stockpiles or shipments.

2. Submit notarized certification of conformance to referenced standards when requested by Engineer.

3. All mix designs shall be accompanied by an Environmental Product Declaration (EPD) in compliance with Article 2.03.

C. Delivery Tickets:

1. The Contractor shall submit to the Engineer a copy of the delivery ticket for each load of concrete delivered to the Site. Delivery tickets shall contain all information specified in ASTM C94 Section 14.1.

2. Provide batch tickets for each batch of job-site mixed concrete as specified.

3. Submit the approved mix proportions, unique mix identifier coordinating with the approved mix design and including an automated time-date stamp on each delivery ticket indicating the batch weights of all batching components.

D. Submit samples of materials as specified and as otherwise may be requested by the Engineer, including names, sources, and descriptions.

E. Shop Drawings:

1. Manufacturer’s specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

2. All information pertinent to a concrete plant to be erected at or near the site as required by the CPMB Publication “Concrete Plant Standards of the Concrete Plant Manufacturers Bureau.”

3. Detailed description of conveying equipment.

4. Detailed description of concrete placement methods.

5. Proposed procedures for bonding new concrete work to existing including manufacturer's information on proposed bonding agents.
6. Proposed normal procedures for protection and curing of concrete including manufacturer's literature for proposed curing compounds.
7. Proposed special procedures for protection of concrete under wet weather placement conditions.
8. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
9. Proposed method for underwater placement.
10. Proposed method of measuring concrete surface temperature changes.
11. Detailed procedures and materials for repair of defective concrete.
12. Detailed procedures for removing stains, rust, efflorescence, and surface deposits.
13. Materials and procedures to be used to plug tie holes, other than for Portland cement mortar.
14. Proposed methods to measure concrete compressive strength by means other than field cured cylinders for termination of curing, such as maturity, penetration resistance, pulse velocity, rebound hammer, or pullout strength.
15. The following information, if ready-mixed concrete is used.
    a. Identification of Ready-Mixed Concrete Supplier including the plant location and all pertinent information required by the CPMB Publication "Concrete Plant Standards of the Plant Manufacturers Bureau."
    b. Locations of sources of materials for cement, fine and coarse aggregates, and water, and the brands and types of admixtures to be used.
    c. Physical capacity of mixing plant.
    d. Trucking facilities available.
    e. Estimated average amount which can be produced and delivered to the site during a normal 8-hour day, excluding the output to other customers.
16. Requests and Notifications:
    a. Request to use the volumetric batching method.
    b. Request for acceptance of preplacement activities: This request is to ensure that the pre-placement activities are complete and have been properly inspected. The General Construction Contractor under this Section shall sign-off on a Concrete Placement Card indicating that their Work is complete, and shall also obtain a sign-off from any other Prime Contractors certifying that their Work has

also been completed, and is ready for placement. A sample of the required Concrete Placement Card is attached at the end of this Section. The Supervising Engineer for Concrete Construction will sign-off on the items to be inspected but this does not relieve the responsible Contractors from coordinating the concrete placement properly, including allowing the concrete inspection and testing to be completed before discharging, and meeting all requirements of the Contract. The Contractor shall submit the completed Concrete Placement Card to the Supervising Engineer for Concrete Construction in accordance with Article 3.01, Paragraph B - Preparation for Concrete of this Section, and with sufficient time to obtain receipt of authorization from DEP to place concrete in conformance with the latest DEP concrete placing guidelines.

c. Advance notification of forthcoming placement including arrangements to coordinate tests and inspection.

d. Requests to exceed the ASTM C 94 required time of discharge.

17. Concrete Placing: Submit layout or description of each placement showing lengths of placements, joint locations/types, sequence of deposits, and projected time between deposits. Include in submittal proposed method for underwater concrete placements where indicated on the Contract Drawings.

18. Submit product data for the following:

a. Cement, supplemental cementitious materials, and cement replacement materials.

b. Aggregates, each type.

c. Admixtures, each type.

d. Curing materials.

19. Submittals for Exposed-to-View Integrally Colored Concrete Work:

a. Submit manufacturer's complete technical data sheets for coloring admixture and curing compound, if applicable.

b. Submit laboratory trial batch information for each mix that is to be used as colored concrete.

c. Submit one sample for color determination for each mix that is to be used as colored concrete:

1) Concrete color samples: 12”x12”x1”, cast flat, using specified form material (without form liner relief), to establish the color. Submit as required to attain approval of the Engineer/Architect.

2) Submit the following for formed concrete work:

a) Samples will be prepared using the materials to be used in the completed Work and per the mix designs in Table 1 and Table 2.

b) Finish half of the sample surface with the specified treatment in Section 03 35 00 – Concrete Finishing, one application, full strength solution, and half of the sample without the finish, as directed by the Engineer/Architect.

c) Submit up to twelve (12) more sample variations of concrete/color admixture as directed by the Engineer/Architect.

d. Final samples: Submit for each approved concrete mix six (6) 16”x16”x2-1/2” samples, cast vertical, simulating the techniques to be used in production casting to reduce the surface air voids and achieve the specified criteria.

F. Test and Inspection Reports:

1. Information on types, classes, procedures, names and plant locations for cementitious materials; types, pit or quarry locations, producers’ names, gradations and properties required by ASTM C 33 for aggregates; types, brand names, producers’ names for admixtures; and source of supply for water and ice.

2. Except for admixtures and water, test results not more than 90 days old confirming the conformance of all concrete materials with applicable specifications.

3. Testing agencies shall submit the results of all tests and inspections performed during the course of the work to the Supervising Engineer for Concrete Construction. Reports from the Testing Agency shall be on forms acceptable to the Supervising Engineer for Concrete Inspection.

4. Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Engineer’s review will be for information only. Production of concrete to comply with the specified requirements is the responsibility of the Contractor.

5. A complete record of the date and details of each concrete placement including the exact location thereof and the date of removal of forms. This record shall be coordinated with and in addition to that maintained by the Supervising Engineer for concrete inspection.

6. Mixture Proportions:

a. Mixture proportions conforming to the requirements of the New York City Administrative Building Code and this Section for water/cement ratio, cement content, slump, maximum size of coarse aggregate, air content, admixtures, and chloride concentration, as well as compressive strength.

b. Method and test data used to establish proportions.

7. Water for Mixing and Curing Concrete: Submit a Mixing Water Supply Plan identifying the source(s) of water for concrete mixing and curing, means and methods of delivering water to any onsite or mobile plant, treatment processes (if needed), and certified laboratory test results for each proposed source demonstrating that the water meets the specified requirements. The Mixing Water Supply Plan shall also include copies of any required permits that are to be obtained by Contractor. Submit all water test results, both passing and failing, during periods of concrete production as required by the specifications.

G. Quality Control Plan:

1. Prepare and submit a Quality Control Plan a minimum of 30 days prior to the Pre-Concrete Construction Meeting. The Quality Control Plan shall include a list of Testing Standards and the frequency at which each test is to be performed. Production of concreting shall not start until as such time as the Contractor's Quality Plan has been submitted to and approved by the Engineer.

H. Quality Control Organization:

1. Prepare and submit a Chart indicating all Quality Control personnel and a description of how these personnel integrate with and report to other management or field construction personnel. Include names, company name and each person's function. The Quality Control organization chart shall include a Program Administrator who shall ensure that all Quality Control procedures are followed and enforced. This person shall be a New York State registered professional engineer, have a BS in civil engineering, and have a minimum of 5 years experience on projects of size and complexity of this contract. This Program Administrator shall be a full time employee of the Contractor or a consultant engineer engaged by the Contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Cement shall be stored in weather tight buildings, bins or silos which will provide protection from dampness and contamination and will minimize warehouse set.

B. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation or contamination with other materials or with any other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured from the aggregates at the point of batching. Frozen or partially frozen particles shall not be used.

C. Stockpiles of natural sand shall be allowed to drain freely to minimize variations in moisture content throughout the stockpile.

D. Admixtures shall be stored in such a manner as to avoid contamination, evaporation or damage. For those used in the form of suspensions or non-stable solutions, suitable agitating equipment shall be provided to ensure uniform distribution of the

ingredients. Liquid admixtures shall be protected from freezing and other temperature changes which would adversely affect their characteristics. All admixture containers shall be clearly marked with paint as to their content and dosage.

1.09 CONCRETE WORK MOCK-UPS AND TEST PLACEMENT

A. Mock-up: Utilizing the required concrete class including the required color additive, cast the concrete for the Spillway concrete mock-up specified in Section 03 10 00 – Concrete Forming and Accessories.

1. Cast the concrete as proposed for the mock-up placements with appropriate delays simulating placement of the actual conditions. Placement procedures should simulate a length of placement that will be encountered in an actual spillway facing placement, including time of placement in the length of a wall and vibration techniques.

2. Test Placement: The contractor shall perform a Test Placement a minimum of two weeks prior to production placement using an approved mix design of any concrete to satisfactorily demonstrate and verify proper workability, finishability, setting characteristics, consolidation and curing procedures and to confirm that specified physical properties are attained for the approved mix proportions. The test placement shall incorporate all the same personnel, equipment, procedures and materials that will be used for full production concreting work. The Department will determine if the Test Placement meets all the Contract Document requirements. In the event the Department deems the Test Placement as unsatisfactory, the Contractor shall remove and repeat the Test Placement at no cost to the Department. The Test Placement shall include all the same features described for the Mock-up for the Spillway Facing as detailed in 03 10 00 – Concrete Forming and Accessories. The Mock-up for the Spillway Facing can serve as the Test Placement provided all requirements of these specifications for both work items are met.

1.10 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.11 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cementitious Replacement Materials

1. Silica fume shall be one of the following:

a. MasterLife SF100, as manufactured by Master Builders Solutions, Beachwood, OH;

b. Force 10,000 D, as manufactured by GCP Applied Technologies, Cambridge, MA.;

c. Sikacrete 950 DP, as manufactured by Sika Corp., Lyndhurst, NJ;

d. Eucon MSA, as manufactured by the Euclid Chemical Company, Cleveland, OH;

e. Or approved equal.

B. Concrete Admixtures:

1. Shrinkage reducing admixtures shall be one of the following:

a. Eclipse, as manufactured by GCP Applied Technologies, Cambridge, MA;

b. MasterLife SRA 035 and MasterLife CRA 007 as manufactured by Master Builders Solutions, Beachwood, OH;

c. Or approved equal.

2. Corrosion inhibiting admixture shall be one of the following:

a. DCI or DCI-S, as manufactured by GCP Applied Technologies, Cambridge, MA;

b. MasterLife CNI, as manufactured by Master Builders Solutions, Beachwood, OH;

c. Eucon CIA, as manufactured by Euclid Chemical Company, Cleveland, OH;

d. Or approved equal.

3. Crystalline waterproofing shall be one of the following:

a. ADMIX as manufactured by Penetron International, East Setauket, NY;

b. Sika WT-215P as manufactured by Sika Corp., Lyndhurst, NJ;

c. MasterLife 300 C or 300D or 300L as manufactured by Master Builders Solutions, MBCC Group, Beachwood, OH;

d. Krystol Internal Membrane (KIM) as manufactured by Kryton, Vancouver, British Columbia, Canada;

e. Xypex C-Series as manufactured by Xypex, Richmond, British Columbia, Canada;

f. Or approved equal.

4. Antiwashout Admixture shall be one of the following:

a. Binding-type viscosity modifier that controls bleeding and thixotropic characteristics.

b. Mastermatrix UW 450 as manufactured by Master Builder Solutions, Beachwood, OH;

c. Eucon AWA as manufactured by Euclid Chemical Company, Cleveland, OH;

d. Sikament – 100 SC as manufactured by Sika Corp., Lyndhurst, NJ;

e. Or approved equal.

C. Concrete bonding agent

1. Two component epoxy-resin bonding agent shall be one of the following:

a. Sikadur 32, Hi Mod LPL, as manufactured Sika Corp., Lyndhurst, NJ;

b. Dural LPL MV, as manufactured by the Euclid Chemical Company, Cleveland, OH;

c. Pro-Poxy 200 as manufactured by Dayton-Superior, Miamisburg, OH;

d. FX-752 as manufactured by Simpson Strong-Tie, Pleasanton, CA;

e. Or approved equal.

2. Three component epoxy modified cementitious bonding agent shall be one of the following:

a. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation.

b. Or approved equal.

D. Finishing Aids:

1. Evaporation retardant shall be one of the following:

a. MasterKure ER 50, as manufactured by Master Builders Solutions, Beachwood, OH;

b. Eucobar, as manufactured by Euclid Chemical Company, Cleveland, OH;

c. SikaFilm, as manufactured by Sika Corp., Lyndhurst, NJ;

d. Or approved equal.

E. Curing and Protection Materials:

1. Curing compounds shall be one of the following:

a. Super Aqua Cure VOX, as manufactured by Euclid Chemical Company, Cleveland, OH;

b. Sealtight 1100, as manufactured by W.R. Meadows, Inc., Hampshire, IL;

c. MasterKure, as manufactured by Master Builders Solutions, Beachwood, OH;

d. Or approved equal.

2. Temperature Monitoring Equipment:

a. Battery-powered, handheld digital thermometers such as model HH508 as manufactured by DwyerOmega (formerly Omega Engineering, Inc.) used with wired thermocouples;

b. Wireless alternatives for temperature monitoring equipment will be considered, subject to approval from the Engineer.

c. Or approved equal.

F. Crack Injection Materials:

1. Epoxy:

a. Epoxies for injection shall be one of the following:

1) Sikadur 35, Hi Mod L.V. and Sikadur 31, Hi-Mod Gel, as manufactured by Sika Corp., Lyndhurst, NJ;

2) Dural Injection Gel, as manufactured by Euclid Chemical Company, Cleveland, OH;

3) Or approved equal.

2. Hydrophilic Resin:

a. Hydrophilic resins shall be one of the following:

1) Sika Inject 215, as manufactured by Sika Corp., Lyndhurst, NJ;

2) Or approved equal.

G. Concrete Repair Materials:

1. Concrete repair mortar shall be one of the following:

a. Five Star Structural Concrete, as manufactured by Five Star Products, Inc., Shelton, CT;

b. SikaTop 122 Plus, SikaTop 123 Plus, SikaTop 111 Plus, or Sikacem 133, as manufactured by Sika Corp., Lyndhurst, NJ;

c. MasterEmaco S 488CI or S 466-CI, as manufactured by Master Builders Solutions, Beachwood, OH;

d. Verticoat or Verticoat Supreme, as manufactured by the Euclid Chemical Company, Cleveland, OH;

e. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Materials listed in this Section apply to all concrete unless specified otherwise in the Contract.

B. Cementitious Materials

1. Cement:

a. Ordinary Portland Cement: ASTM C 150 of the following Type:

1) Type II, Moderate Sulfate Resistance.

b. Blended Hydraulic Cement: ASTM C595

1) Type IL Portland Limestone Cement (MS): Moderate Sulfate Resistance: (MH) Moderate Heat of Hydration.

c. Cement type used shall be appropriate for site exposures.

1) NYCBC 1904.4

d. Portland cement shall be produced by an acceptable, recognized manufacturer. The cement shall be produced by one plant only per mix design. Alternate cement sources may be used provided that a mix design has been accepted and a trial batch verifying performance has been made.

e. Cement which has deteriorated because of improper storage or handling shall be rejected.

2. Fly Ash and Natural Pozzolans:

a. Fly ash mineral admixture, when used, shall meet the requirements of ASTM C 618 Class F, except as follows:

1) The loss on ignition shall be a maximum of 4%.

2) The maximum percent of sulfur trioxide (SO_3) shall be 4.0.

3) Available alkalis expressed as equivalent Na_2O shall not exceed 1.5%.

4) Calcium oxide content shall not exceed 8.0 percent as determined by ASTM C 114.

b. Natural pozzolan mineral admixture, when used, shall meet the requirements of ASTM C 618 Class N.

c. Fly ash and natural pozzolans used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

d. Fly ash and natural pozzolans shall be sampled and tested in accordance with ASTM C 311.

e. Source of fly ash or natural pozzolans used in each concrete mix shall not change without approval of the Engineer.

3. Ground Granulated Blast Furnace Slag:

a. Ground granulated blast furnace slag (GGBF) mineral admixture, when used, shall meet the requirements of ASTM C 989, Grade 100 or better.

b. GGBF slag will be permitted as a substitute for fly ash or natural pozzolans, at no additional cost to DEP, in the event that Class F Fly Ash or Class N natural pozzolans are not available. The slag

substitution shall be in the same proportions and percentages of the total cementitious material as indicated for Fly Ash. A higher percentage of GGBF slag of the total cementitious material in concrete shall be permitted as approved by the Engineer to suit the project needs.

c. Laboratory trial batches will be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

d. GGBF slag used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

4. Silica Fume:

a. Silica fume mineral admixture shall be the dry compacted or slurry form and shall meet the requirements of ASTM C 1240. Silica Fume shall be considered to be a cementitious material. Application rate shall be 7 percent by weight of cement, if used, unless indicated otherwise.

C. Aggregate

1. Coarse and fine aggregates shall meet the requirements of ASTM C 33 with the requirements of Table 3, Class 4S, and shall be from a New York State Department of Transportation approved source for use in Portland Cement Concrete. Soundness shall be tested using magnesium sulfate. Abrasion resistance shall be tested using the Los Angeles Abrasion Test. For testing requirements, concrete shall be assumed to be subject to abrasion. Provide only from approved list of NYSDOT list. Aggregates with an ASR Flag shall not be considered or provided for concrete mixes

2. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces. Marine dredged aggregates shall not be used.

3. The loading, storing, unloading, and batching of aggregates shall be done in such a manner as to prevent segregation, intermingling, or the inclusion of foreign materials. All aggregates shall remain in free drainage storage until a stable moisture content is attained prior to placement in the batching plant bins. Each size of coarse aggregate and the fine aggregate shall be kept in separate hoppers or bins. All aggregates shall be delivered to the batching plant bins by a belt conveyor or other approved means; and the operation thereof shall be controlled so as to prevent the mixing of the sizes and kinds of aggregates with each other. Any mixture of fine and coarse aggregates or of the two sizes of coarse aggregate in the batching plant bins or prior thereto shall be cause for rejection of such materials, and the affected bin or bins shall be emptied and inspected prior to refilling with the correctly graded aggregate.

4. Fine Aggregates:

a. Fine aggregate shall be composed of clean, sharp, hard, strong, durable, insoluble, uncoated, natural sand free from loam, clay lumps or other deleterious substances.

b. Dune sand, bank run sand and manufactured sand are not acceptable.

c. Sand having FM less than 2.40 or greater than 3.00 shall not be allowed.

d. Fine aggregate shall meet the requirements of ASTM C 33 except that loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

5. Coarse Aggregates:

a. Coarse aggregate shall be crushed stone processed from natural rock or stone and shall consist of clean, hard, strong, durable, insoluble, unweathered, and uncoated pieces of uniform quality throughout; and shall be free from such alkali, decomposed minerals, organic material, clay, mica, schist, or other foreign matter that will render it unsuitable.

b. Use of slag and pit or bank run gravel is not permitted.

c. Permitted sizes for coarse aggregate gradations are indicated in Table 1 - Concrete Mix Requirements at the end of this Section. Aggregates from column A must be utilized either separately or combined with aggregate from columns B or C as required to meet combined aggregate gradation requirements and to maximize workability of the mix.

d. Coarse aggregate shall meet the requirements of ASTM C 33, Table 3, Class 4S, with the following additional requirements.

1) Clay lumps shall not exceed 1.0 percent by weight of coarse aggregate.

2) Shale and other soft particles shall not exceed 3.0 percent by weight of coarse aggregate.

3) Thin, elongated, or laminated particles shall not exceed 3.0 percent by weight of coarse aggregate.

4) Loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

e. Nominal maximum size of coarse aggregate shall be not larger than:

1) 1/5 the narrowest dimension between sides of forms, nor

2) 1/3 the depth of slabs, nor

3) 3/4 the maximum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons or ducts.

6. Combined Aggregate:

   a. Aggregate gradations shall be determined during trial batch testing and shall be based upon the combined gradation and particle distribution in the mixture of coarse and fine aggregates.

   b. Fine aggregate and coarse aggregate sizes specified shall be combined to produce a workable and cohesive concrete mix that is appropriate for its specific application. Coarse aggregate contents shall be based on Table 6.3.6 of ACI 211.1. Trial mix proportioning in accordance with this specification section shall be completed for any concrete mix used on the job and shall be repeated if the aggregate content, aggregate blend, or any other mix proportions are changed for any reason. All other requirements of this specification must be met regardless of any adjustments to the aggregate content to facilitate pumping.

   c. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for Normal Weight Concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for Normal Weight Concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer

   d. Gradations of combined aggregate shall be plotted and submitted on:

      1) A combined grading chart (percent passing versus sieve size).

      2) An aggregate Particle Distribution Chart (percent retained versus sieve size).

7. Testing for Reactivity: Selection of concrete aggregates is of paramount importance to the quality of the concrete and to the economy and durability of the structure. Aggregates shall conform to the requirements of ASTM C 88, C 227, and C 1260. Aggregates shall be selected from the NYSDOT Approved Aggregate Source List that do not have an ASR Flag. If aggregates are potentially reactive, the following testing requirements shall be employed.

   a. Test the coarse and fine aggregate sources in accordance with ASTM C 227. Aggregates tested in accordance with ASTM C 227 shall be considered potentially reactive if expansion exceeds 0.10% at 6 months or 0.05% at 3 months if 6-month test results are not available.

b. Test the coarse and fine aggregate sources in accordance with ASTM C 1260. Aggregates tested in accordance with ASTM C 1260 shall be considered potentially reactive if expansion exceeds 0.10% at 16 days.

c. Aggregates that are shown to be potentially reactive based on testing in accordance with ASTM C 227 or ASTM C 1260 shall not be used without additional testing and written approval by the Engineer. Additional testing shall include testing in accordance with procedures in ASTM C 295, ASTM C 856, ASTM C 1567, additional tests in accordance with ASTM C 1260, and other tests as requested by the Engineer. Approval of any aggregate source that is shown to be potentially reactive based on testing in accordance with ASTM C 227 or ASTM C 1260 is at the sole discretion of the Engineer and is not guaranteed regardless of the results of any additional tests performed.

D. Concrete Admixtures

1. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instructions. All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by Engineer.

2. Air entraining admixtures shall conform to the NYS DOT Materials Bureau approved list and ASTM C 260.

3. Normal range or midrange water reducing admixture shall be in conformance with ASTM C 494 Type A, and comply with the NYS DOT Materials Bureau approved list.

4. High-Range Water Reducing Admixture:

a. High range water reducer shall conform to ASTM C 494, Type F or G and comply with the NYS DOT Materials Bureau approved list.

b. The high range water-reducing admixture shall be accurately measured and added at the batch plant facility. The Contractor may redose the concrete no more than 2 times with the high range water reducer at the site, provided that a calibrated dispenser system and containers of high range water reducer sealed and labeled by the manufacturer are used.

5. Set Controlling Admixture:

a. Set controlling admixture shall be either with or without water-reducing properties.

b. Where the air temperature at the time of placement is expected to be consistently over 90 degrees Fahrenheit, a water-reducing set

controlled admixture conforming to ASTM C 494, Type D and the NYS DOT Materials Bureau approved list.

6. Shrinkage Reducing Admixture:
   a. A shrinkage-reducing admixture is permitted to be used in the mix design where necessary to meet specified shrinkage limitations provided that specified strength requirements are met and there is no reduction in sulfate resistance and no increase in permeability.
   b. Shrinkage reducing admixture conforming to ASTM C494 Type S.
7. Corrosion Inhibiting Admixture:
   a. A corrosion inhibiting admixture shall be used in all concrete mixes and shall be a calcium nitrite solution containing a minimum of 30 percent calcium nitrite.
   b. The quantity of mix water shall be adjusted to account for the water portion of the calcium nitrite solution.
   c. As the calcium nitrite solution accelerates setting time, retarding admixtures shall be provided as needed, unless the admixture has been formulated to not accelerate setting.
   d. Corrosion inhibiting admixture conforming to ASTM C494 Type C & E.
8. Calcium chloride, admixtures containing thiocyanate, or admixtures containing more than 0.05 percent chloride ions shall not be used.
9. Crystalline Waterproofing: Add crystalline waterproofing to concrete as follows:
   a. Add crystalline waterproofing to HLRT foundation base slab and HLRT walls below El. 1138.5 feet.
   b. Concrete waterproofing system shall be of the crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against the penetration of liquids from any direction, and shall protect the concrete from deterioration due to harsh environmental conditions.
   c. Crystalline waterproofing admixture shall use appropriate manufacturer's product for specific contract work.
   d. Add crystalline waterproofing additive at the batch plant.
10. Antiwashout Admixture (Underwater Concrete):
    a. Antiwashout admixture is to prevent the loss of the cement and fine aggregate during the placement of underwater concrete.
    b. The antiwashout admixture used for underwater concrete construction shall be as specified in this Section.

c. Do not use water to adjust slump after antiwashout admixture has been dispensed.

d. Antiwashout admixture conforming to ASTM C494 Type S.

E. Water

1. Water for concrete, mortar, and grout shall be clean and free from objectionable mineral salts and from injurious amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel. Water shall meet the requirements of ASTM C 94 and ASTM C 1602 except that water recovered from concrete production operations shall not be used as mixing water.

a. Water used for concrete, mortar, and grout that is not potable water as defined in ASTM C 1602 shall also meet all optional limits in ASTM C 1602, Table 2 (2006 revision), except as follows. If chloride content of the source water exceeds the specified limit of 1,000 ppm, then the chloride limits for reinforced concrete in wet conditions shown in Table 3.1 of ACI 222R shall govern. The chloride criteria applies to all concrete except Class 25 concrete. Water source(s) used as mixing water shall be tested monthly until all concrete, mortar, or grout production is completed, except during extended periods when no mixing water is used, such as the initial project start up and winter shutdowns. Water source(s) shall be tested prior to starting concreting operations, and prior to re-starting concreting operations following any extended periods when no mixing water is used. More frequent water quality testing or concrete strength performance testing may be required in response to fluctuations in source water quality, particularly if surface waters are utilized that may be susceptible to rapid changes in turbidity and organic content.

F. Bonding Agent

1. Provide a two component epoxy-resin bonding agent conforming to ASTM C 881.

2. Provide three component epoxy modified cementitious bonding agent where two component bonding agent does not provide sufficient open time.

G. Finishing Aids

1. Evaporation Retardant:

a. Evaporation retardant shall be a material which seals the surface of plastic concrete to prevent moisture loss. The material shall be able to be worked into the concrete surface by subsequent finishing operations with no adverse effect on finishing effort and no discoloration of the finished concrete.

H. Curing and Protection Materials

1. Absorptive covers shall consist of burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.
2. Curing mats shall be heavy carpets or cotton mats, quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.
3. Moisture retaining covers shall conform to ASTM C 171 and consist of one of the following materials.
    a. Waterproof paper.
    b. Polyethylene film.
    c. White burlap-polyethylene sheet.
4. Curing compounds shall conform to the requirements of ASTM C 309 Type 1-D (water retention requirements):
    a. Provide fugitive dye unless waived by the Engineer.
5. Insulation Blankets:
    a. Closed cell flexible foam sheet material such as polystyrene or urethane. Foam sheet material which is capable of being bent 90 degrees without breaking or tearing shall be provided at corners. The foam insulation blankets shall be 1/2-inch thick.
    b. Quilted, flexible insulation blankets that retain their insulating value when wet and which retard the evaporation of water.
6. Temperature Monitoring Equipment:
    a. Thermocouples or thermistors shall be as manufactured by . DwyerOmega or equal. They shall be suitable for embedment in concrete and capable of registering temperatures within the accuracy of 0.5 degrees Fahrenheit over a minimum temperature range of 20 to 200 degrees Fahrenheit. Provide thermocouple or thermistor type that is appropriate to the length of wire run required, as per manufacturer's recommendation.
    b. Temperature monitoring and recording equipment shall consist of battery-powered, handheld digital thermometers such as model HH508 as manufactured by DwyerOmega or approved equal. The thermometer units shall be compatible with the temperature sensors used. The thermometer unit shall be designed and constructed for construction conditions. Sufficient thermometer units shall be provided to take readings from all temperature sensors, plus two additional backup units, one of which shall be provided to the Engineer.

I. Crack Injection Materials

1. Epoxy:

a. Epoxy for injection shall be a low viscosity, high modulus moisture insensitive type.

2. Hydrophilic Resin:

a. Hydrophilic resin shall be an acrylic-ester based resin with a maximum viscosity of 50 cps. It shall cure into a flexible rubber-like material which has the potential for unrestrained increase in volume in excess of 100 percent in the presence of water.

J. Concrete Repair Materials

1. Concrete repair mortar shall be a prepackaged polymer-modified cementitious repair mortar with the following minimum properties:

a. Compressive strength at one day: 2000 psi (ASTM C 109).

b. Compressive strength at 28 days: 6000 psi (ASTM C 109).

c. Bond strength at 28 days: 1800 psi (ASTM C 882 modified).

2. Cement mortar shall consist of a mix of 1 part cement to 1 1/2 parts sand with sufficient water to form a trowelable consistency. Minimum compressive strength at 28 days shall be 4000 psi. Where required to match the color of adjacent concrete surfaces, white portland cement shall be blended with standard portland cement so that, when dry, the patching mortar shall match the color of the surrounding concrete.

K. Materials for Exterior Exposed-to-View Concrete to be integrally colored:

1. All mixes for Exposed-to-View surfaces that are designated to be colored in Article 1.05.B and Table 2 at the end of this Section shall match the color approved by the Engineer/Architect.

2. Mix design shall be as shown in Table 1 and Table 2 at the end of this Section.

3. Color admixture shall be added into the concrete mix to achieve a color that provides the closest possible match with existing concrete.

a. The previous sample color used as a basis for design of the spillway colored concrete was from L. M. Scofield Corp. using C34 “Dark Grey”, added in liquid form of 60% aqueous solution at 10 pounds per cwt of cementitious material.

b. The previous color admixture used in the spillway concrete mix of Construction Contract CAT-212B was from Davis Colors using Liquid Black Iron Oxide A875 at a pigment level of approximately 8%.

c. Contractor shall consult with color admixture suppliers to provide the closest possible match with the existing concrete.

d. Contractor shall prove color match of selected color admixture through provided samples and trial batching in accordance with Article 1.07, Paragraph E.19 of this Section.

4. If the Contractor seeks to use an approved equal coloring admixture, in addition to the submittals required herein, the Contractor shall provide documentation that the proposed coloring additives have a 10-year proven record of successful performance, and the Contractor must prepare for approval 3 trial placements, each not less than 3 cy and not less than 100 square feet on one exposed surface. If approved by the Engineer, the mock-up required under Section 03 10 00 - Concrete Forming and Accessories, can incorporate the required trials.

5. Where curing compound is allowed, it shall comply with ASTM C309 and be of the same manufacturer as the colored admixture.

L. Epoxy Adhesive for Drilled Dowels shall comply with these specifications and those of Section 03 21 00 – Reinforcing Steel.

M. Cementitious Grout for Hollow-Core Anchors shall comply with these specifications and those of Section 03 21 00 – Reinforcing Steel and Section 03 60 00 – Grouting.

N. Underwater Concrete:

1. All concrete placed underwater shall contain an approved antiwashout admixture as specified in this section, or consist of an approved pre-manufactured tremie concrete mix.

2. Antiwashout admixture shall be used only for concrete placed underwater at the HLRT and in strict accordance with the manufacturer's directions.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Proportioning and Mixing

1. Prepare concrete design mixes subject to the limitations listed in Table 1 and specified herein so as to create a homogeneous mix and a concrete which meets the specified strength requirements and, of equal importance, provides a concrete which is water tight and durable against deterioration and abrasion. The mix design shall produce a concrete of a consistency which can be placed so as to meet the required finished appearance. The minimum cement necessary to produce the required strength shall be used. This Section applies to concrete mixes using ¾-inch and larger nominal maximum aggregate. For mixes using smaller aggregate sizes, see Section 03 60 00 - Grouting. The mix design shall be submitted using the Mix Design Submittal Form at the end of this Section.

2. Global Warming Potential Limits

a. Submit an EPD for ready-mix concrete, for approval by the Engineer.

1) The value given for the Global Warming Potential (GWP) of a mix will be the A1 GWP listed on the EPD.

a) All ready-mix concrete supplied to the construction site shall be delivered with an EPD. Failure to submit an EPD will exclude the mix from being used.

b) EPDs shall be submitted using the project Web-Based Project Management Information System in accordance with Section 01 31 25 - Web-Based Project Management Information System. EPDs shall be submitted together with the relevant material submittal for approval by the Engineer.

3. Air Content:

a. All concrete shall be air entrained unless indicated otherwise.

b. Air content for Normal Weight Concrete shall be as follows:

Nominal Maximum Aggregate Size (in.)	Total Air Content, percent by Volume (+/- 1.5%)
1/2	7
3/4	6
1	6
1-1/2	5.5

4. Slump:

a. Slump for all concrete shall be 3 +/- 1 inches, unless indicated otherwise.

b. A higher slump for the Class 40P concrete mix will be required and should be less than or equal to 8 inches, in order to provide a workable mix.

c. Where high range water reducing admixture is used, the specified water-cementitious material ratio shall be reduced by 0.02 and concrete shall be proportioned for no higher than 3-inch slump. The slump after addition of the high range water reducing admixture shall not exceed 8 inches when measured at the point of placement, unless indicated otherwise.

d. A tolerance of up to 2 inch above the maximum indicated slump shall be allowed for one batch in any five consecutive batches tested provided that it can be demonstrated that the specified water-cementitious material ratio is not exceeded.

e. Slump for Class 40M concrete shall be 0 to 1 inches prior to addition of the high range water reducing admixture and 1 to 3 inches after addition of the high range water reducing admixture.

1) A slump of up to 4 inches for Class 40M concrete will be allowed given that the additional slump is obtained by the addition of the approved high-range water reducing admixture only and not by any increase in the mix water or water-cement ratio.

5. Shrinkage Limitation:

   a. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age shall be 0.039 percent or 0.045 percent, respectively. The Contractor shall only use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to Classes 40M, 45 and 45F concretes, unless indicated otherwise.

   b. If the trial batch results fail to meet the shrinkage limitation, the mix shall be redesigned to reduce shrinkage. Alternately, the Contractor may use a higher shrinkage mix when acceptable to the Engineer, provided that the amount of shrinkage reinforcement in the structures is increased as determined by the Engineer to resist the higher levels of shrinkage stresses. The additional reinforcing shall be provided at the Contractor's expense.

6. The percentage of mortar in the concrete mix shall not exceed 60 percent for Class 50, 45 and 45F concrete. Exceeding this specified mortar percentage shall only be acceptable when approved by the Engineer.

7. Proportioning: Concrete proportions shall be determined in accordance with the provisions of Sections 1905.2.1 through 1905.2.3 of the NYCBC.

   a. Proportions of materials for concrete shall be established to provide

      1) The proportioning of ingredients shall produce a mixture that will provide workability and consistency to permit concrete to be worked readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate or excessive bleeding. Yield of all mixes as designed shall not exceed 27.2 cu.ft./cu.yd.

      2) Resistance to special exposures is required by NYCBC Section 1904.

      3) Conformance with the strength test requirements of Sections 1905.6

   b. Concrete is to meet the durability requirements of Section 1904 of NYCBC.

   c. Where different materials are to be used for different portions of proposed work, each combination shall be evaluated.

d. Concrete proportions shall be established in accordance with NYCBC Section 1905.3 or Section 1905.4, and shall comply with the applicable requirements of Section 1904.

1) NYCBC Section 1905.3 - Proportioning on the basis of field experience/or trial mixtures. Concrete proportioning determined on the basis of field experience or trial mixtures shall be done in accordance with ACI 318, Section 5.3. If the required f'_c is obtained for trial batch mixed prior to the date specified, the trial mix design may be approved. All mixes shall be approved by the Engineer prior to construction.

2) NYCBC Section 1905.4 - Proportioning without field experience. Concrete proportioning determined without field experience or trial mixtures shall be done in accordance with ACI 318, Section 5.4. This method of proportioning shall not be permitted for load-carrying structural concrete or concrete mix proportions that are required to conform to NYCBC Section 1904.

e. Proportioning on the basis of field experience and/or trial mixtures using a mix design employing the same ingredients proposed for use, and used successfully on a previous project, or projects, may be used provided the following are submitted by a licensed concrete testing laboratory and approved by the Engineer in conformance with NYCBC 1905.3 and ACI 318 Section 5.3..

1) The name and location of the plant from which the concrete will be batched.

2) The concrete mix design including detailed data and analysis of the ingredients proposed for use as specified herein.

3) Reports for at least 30 (thirty) consecutive tests of 7 day and 28 day concrete strength tests of the proposed mix made during the previous twelve months of concrete batched and delivered from the same plant that is to furnish this job. These data shall include an evaluation in accordance with ACI 214R to determine the average strengths, moving averages and the coefficients of variation. In addition, the results of a minimum of 3 shrinkage tests for this mix made during the previous twelve months and using the same materials to be used on this project.

4) Reports of compliance tests of fine and coarse aggregates made during the above tests.

f. Average strength reduction. As data becomes available during construction, it is permissible to reduce the amount by which the average compressive strength (f'_c) is required to exceed the specified value of f'_c in accordance with ACI 318, Section 5.5

g. Evaluation and acceptance of concrete. The criteria for evaluation and acceptance of concrete shall be as specified in NYCBC Sections 1905.6.3.3 through 1905.6.5.5.

h. Qualified technicians. Concrete frequency and testing shall be tested in accordance with the requirements of NYCBC Section 1905.6.2 thru 1905.6.5.5. An agency shall perform tests on fresh concrete at the job site, prepare specimens required for curing under field conditions, prepare specimens required for testing in the laboratory and record the temperature of the fresh concrete when preparing specimens for strength tests. All field sampling and testing, including the testing of aggregates, concrete mixes, and strength testing of specimens, shall be subject to special inspection by an approved agency. All testing laboratories shall be approved testing agencies and shall employ qualified special inspectors to perform all required laboratory tests. Test results from the testing laboratory shall be promptly distributed by the Contractor to the concrete producer and the Engineer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Inspection

1. The Contractor and its installer shall examine the substrate and the conditions under which Work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Preparation for Concrete

1. All reinforcement, installation of waterstop, positioning of embedded items, and condition of formwork shall be inspected and approved by the Supervising Engineer for Concrete Construction prior to concrete placement. Contractor shall provide written notice of intention to place concrete a minimum of one (1) working day prior to placement.

2. The Contractor shall provide the following preparation before placing of concrete.

a. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

b. Formwork shall have been completed in conformance with Section 03 10 00 - Concrete Forming and Accessories; ice and standing water shall have been removed; reinforcement shall have been

secured in place in conformance with Section 03 21 00 - Reinforcing Steel; expansion joint material, anchors and other embedded items shall have been positioned. Concrete shall not be placed on frozen ground.

c. Subgrade shall be watered sufficiently to achieve surface saturated density of subgrade materials.

d. Soft spots in subgrade shall be removed and replaced with approved backfill materials.

e. No concrete shall be placed until the entire preparation has been approved by the Supervising Engineer for Concrete Construction or his authorized representative.

f. When high ambient temperatures necessitate protection of concrete immediately after placing or finishing, make provisions in advance of concrete placement for windbreaks, shading, fogging, sprinkling, ponding, or wet covering with a light colored material.

g. During cold weather, make provisions in advance of concrete placement to maintain the temperature of the concrete above 55ºF. Use heating, covering or other means adequate to maintain the required temperature without injury to concrete due to concentration of heat. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases containing carbon dioxide.

h. Unwatering: All concrete should be placed in an unwatered condition except where indicated on the Contract Drawings as Work that is part of Underwater Construction.

i. Over-excavation: Areas demolished or excavated beyond authorized limits shall be refilled with concrete or an approved material to the correct lines and grades at no additional cost.

j. HLRT Foundation Preparation: Perform foundation preparation as shown on the Drawings. See additional requirements for underwater construction and diving services in Section 01 35 00 – Diving Services.

k. Tremie Concrete Pad: Place a leveling Tremie Concrete Pad between the approved and prepared foundation surface and the bottom of the required structural concrete as shown on the Contract Drawings. Tremie Concrete Pad is intended as backfill material where existing grade is lower than that required for the completed structural features. Tremie Concrete Pad will be placed underwater.

l. Surveys of finished foundation: Upon completion of placement of Tremie Concrete Pad, but prior to setting stay-in-place forms or any structural concrete placement, the Contractor shall perform a survey of the finished Tremie Concrete Pad surface. This survey will be

the basis for record drawing documentation. Locations of all anchor bars shall be provided. See Section 02 30 00 – Fill for bathymetric survey requirements.

m. Drilled Hollow-Core Anchors/Drilled Dowels:

1) Drill holes for each bar to the size and depth indicated on the Drawings, and in accordance with manufacturer recommendations, with carbide tip bit or star bit or by core drilling.

2) Blow clean each finished hole with an oil free air jet and then flush with a jet of clean water.

3) For holes above the water surface and immediately prior to the grouting operation, remove all water from the hole and from the walls of the hole.

4) Pump dispensing gun for proper mixture in accordance with Section 03 21 00 – Reinforcing Steel and Section 03 60 00 – Grouting. Insert nozzle and pump epoxy adhesive or cementitious grout into the hole and insert bar. Do not retemper grout that has begun to stiffen; discard such grout.

5) Follow all manufacturer's recommendations for installation of epoxy adhesive or grout.

6) A professional diver should be utilized to prepare, inspect, and install the anchors underwater. See additional details regarding underwater construction and diving services in this Section and Section 01 35 00 – Diving Services.

3.02 IMPLEMENTATION

A. Mixing and Transporting Concrete

1. General:

a. The Contractor shall provide the production of concrete which includes batching, mixing, delivering, and discharging of concrete according to the following requirements.

2. Ready-Mixed Concrete:

a. Ready-Mixed concrete shall be batched, mixed and transported in accordance with the appropriate sections of "Specifications for Ready-Mixed Concrete" (ASTM C 94 or ASTM C685). Follow the detailed recommendations given in Guide for Measuring, Mixing, Transporting, and Placing Concrete (ACI 304R), where applicable.

b. Each truck mixer or agitator shall have attached thereto in a prominent place a metal plate issued by the Truck Mixer's Manufacturer's Bureau by the manufacturer complying with Section 11.1.2 of

ASTM C 94 for that truck mixer and the limitations thereon shall be strictly adhered to.

c. Ready-mixed concrete shall only be batched in plants which meet the following:

1) Concrete plants shall be certified by the National Ready Mixed Concrete Association (NRMCA) and shall comply with the rules of the department.

2) Upon written application by the producer, accompanied by a detailed report on how the facilities compare with the standards of the NRMCA, the above requirements may be waived, in writing by the Engineer.

3) If the detailed report mentioned above is issued by the testing agency which will perform the inspection of the batching and mixing of the concrete and indicates that satisfactory quality concrete can be produced by the plant in question, based on prior job performance records, then the above requirement will be waived, in writing, by the Supervising Engineer for Concrete Construction.

d. Approval of plants as outlined above is subject to the continuous checking and acceptance by the Commissioner or his duly authorized representative.

e. Only plants meeting the requirements of the standards for certification of the NRMCA for automatic batching and automatic recording will be permitted.

1) If at any time automatic proportioning or recording instruments become inoperative, the plant may be allowed to batch concrete manually or operate with manual recording for a period of not more than 48 working hours from the time of breakdown.

2) If at the end of 48 working hours, the plant is still not in operating order, the following shall be complied with:

a) DEP shall be contacted and an independent inspector, other than the regular plant inspector shall be assigned to each batching operation at the plant, at no additional cost to DEP.

b) Additional inspectors shall observe and record the weight of each component of the batch.

c) The manually recorded batch weights shall appear on a ticket presented to inspection personnel at the project site.

f. The concrete plant must be certified by the NRMCA and have on staff a full time:

1) NRMCA Certified Ready Mixed Concrete Plant Manager;

2) NRMCA Certified Plant Operator;

3) NRMCA Certified Safety Officer; and

4) NRMCA Certified Concrete Technologist Level 4.

g. All concrete trucks delivering concrete to the Project must have current approval of both the NYSDOT and NRMCA certifications. All drivers of Concrete Trucks must have current NRMCA Concrete Delivery Professional Certifications.

h. Concrete producers shall have their plants inspected quarterly by NYSDOT.

i. Concrete producers shall have their scales and trucks certified quarterly by NYSDOT.

3. Batch Mixing at Site or Mobile Batch Plant:

a. The concrete shall be produced in a plant conforming to the requirements of the "Concrete Plant Standards" of the Concrete Plant Manufacturer's Bureau and ACI 318, Section 5.8.3. Prior to erection of such plant at or near the site, the Contractor shall submit to the Supervising Engineer for Concrete Construction, for approval, all pertinent data relative to the plant.

b. The concrete plant shall meet all the requirements of paragraph 3.02.A.2, and all components of the plant must bear the proper rating plates issued by the Concrete Plant Manufacturers Bureau or equivalent and the limitations thereon shall be strictly adhered to.

c. On job site plants for jobs requiring less than 1000 cubic yards of structural concrete or a job site plant that would operate for less than 30 working days duration, the requirements of Article 3.02 Paragraph A.2.e. for automatic batching and automatic recording will be waived. If at any time automatic proportioning devices or recording instruments become inoperative, follow the provisions of Article 3.02, Paragraphs A.2.e.1 and A.2.e.2.

d. The batch shall be so charged into mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. When concrete of normal weight is specified, controls shall be provided to insure that no additional water may be added during mixing. The entire batch shall be discharged before the mixer is recharged.

e. Each batch of 2 cu.yd. or less shall be mixed for not less than 1 1/2 minutes. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. Shorter mixing time may be permitted provided performance tests made in accordance with ASTM C 94 indicate that the time is sufficient to produce uniform concrete. At least three quarters of the required mixing time shall take place after the last of the mixing water has been added. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Replace mixer blades when they have lost 10 percent of their original weight.

f. When small quantities of concrete are produced on the site, measure solid materials by weight, and liquid or paste materials by weight or by volume. Mix all materials in a mechanical mixer. If packaged dry combined materials are used, they shall conform to the requirements of ASTM C 387, and shall be capable of satisfying the requirements of this Standard Specification.

g. Concrete Mixing Plant(s) shall include all necessary mixers, volumetric or weight controls, storage bins, feed systems, and discharge mechanisms and conform to the requirements of ASTM C 94.

h. Plant Calibration:

1) Initial Plant Calibration: Perform Initial Plant Calibration prior to beginning production for this project and prior to performing the Initial Mixer Uniformity testing.

2) Subsequent Plant Calibrations: Perform subsequent Plant Calibrations at intervals recommended by the plant/equipment manufacturer, or any time quality control measures indicate a problem with the plant that could be a result of plant calibrations.

i. Requirements:

1) Any on-site or mobile concrete plant must meet all requirements of ASTM C 94 for central-mixed concrete.

2) Personnel Qualifications: Plant Operators shall have similar responsible experience on at least two projects of similar nature and magnitude as this project with regard to concrete production. Submit Qualification Statements for proposed personnel identifying respective roles on prior projects, project name, location and volume of concrete placed on each project.

3) Certify scales and calibrate plant in accordance with plant manufacturer's written instructions. Prepare and submit certifications and/or calibration reports.

4) Scales (if used) for Weigh Batching: Check the accuracy of scales with test weights by an independent testing firm.

5) Water Metering: Check the accuracy of water metering devices against other calibrated volumetric or weight measuring devices. Use samples of sufficient size to give accurate determinations.

6) Include confirmation through either plant output or other means that the plant computer system is accurately reporting mix components.

j. Mixer Uniformity Testing:

1) Mixer uniformity testing must be performed in accordance with ASTM C 94 for each class of concrete prior to using any on-site or mobile plant to produce that class of concrete.

a) Obtain 3 samples from 3 separate batches of concrete. Each batch shall be the same size and mixed for the same duration as proposed for production batching. Following completion of testing on all 3 samples, compute the Allowable Maximum Difference for each test.

2) Plant scale certifications and mixer uniformity testing must be repeated every 60 shifts of operation at a minimum and any time changes in the concrete are observed that could be a result of mixer uniformity.

3) Subsequent concrete uniformity testing shall also be performed after any Concrete Mixing Plant Calibrations in accordance with ASTM C 94.

k. All concrete shall be weight batched. Volumetric measuring and/or continuous mixing methods shall not be used for any concrete production.

4. Control of Admixtures:

a. Air entraining and chemical admixtures shall be charged into the mixture as a solution and shall be dispensed by an automatic dispenser or similar measuring device. The accuracy of measurement of any admixture shall be within ±3 percent. Admixtures shall be charged into the mixer in such manner as not to come into direct contact with the cement.

b. Two or more admixtures may be used in the same concrete provided such admixtures are added separately during the batching sequence and provided further that evidence is submitted to show that the admixtures used in that combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

c. All admixtures, except water reducing admixtures, shall be added prior to mixing.

d. In the event the distance between the concrete plant and the site is significant, admixtures may be utilized when approved by the Engineer to retard set time of the approved concrete mix to allow up to one additional hour, or 2 ½ hours total, between introduction of mixing water to the cement and aggregates or the introduction of the cement to the aggregates and completion of discharge of the concrete.

5. [Not Used].

6. Tempering and Control of Mixing Water:

a. Concrete shall be mixed only at the mix plants or at the job site. Concrete shall be mixed in quantities not to exceed immediate job placement requirements.

b. The addition of any water to the mix while the truck is en route from plant to job site is strictly prohibited. Mixing in transit is strictly prohibited. Agitating in transit is permitted, but shall be kept to a minimum.

c. When concrete arrives at the point of delivery with a slump below that which will result in the specified slump at the point of placement and is unsuitable for placing at that slump, the slump may be adjusted to the specified value by adding water if all the water required in the accepted mixture proportions has not been added at the start of mixing and if permitted by the Engineer. Addition of water shall be in accordance with ASTM C 94. Neither the specified water-cement ratio nor slump shall be exceeded. Do not make slump adjustments after 15 percent of the batch has been unloaded. Do not add water to concrete containing a plasticizing or a high range water reducing admixture. Slump adjustments made onsite must be obtained by the addition of the approved high-range water reducing admixture only and not by any increase in the mix water or water-cement ratio. Do not add water to concrete in delivery equipment not acceptable for mixing. Measure air content of air-entrained concrete, after slump adjustment, to verify compliance to specified requirements.

d. Each increment of water added at the job site must be incorporated by additional mixing by turning the drum not less than 30 revolutions. The addition of the increments of water and the start of the mixing procedures shall not be commenced earlier than one-half hour prior to the beginning of discharge. From the time the batch or load has been mixed to the specified slump, no further water shall be added to the concrete.

e. Discharge of the concrete shall be completed within the limits set out in the following table. Time and drum revolution limits shall be measured from the introduction of any mixing water to the cement and aggregates or the introduction of the cement to the aggregates (ribbon loading).

CONCRETE DISCHARGE REQUIREMENTS	
Concrete Temperature	Limit
Over 90 degrees F	Concrete shall be removed from site and discarded
85° to 90 degrees F	1 hour or 300 revolutions, whichever comes first
80° to 85 degrees F	1 hour 15 minutes or 300 revolutions, whichever comes first
70° to 80 degrees F	1 hour 30 minutes or 300 revolutions, whichever comes first
Below 70 degrees F	2 hours or 300 revolutions, whichever comes first

7. Weather Conditions:

a. Cold Weather:

1) To maintain the temperature of the concrete above the minimum placing temperature required by Article 3.02, Paragraph B.4.c, the as-mixed temperature shall not be less than 55 degrees F when the mean temperature falls below 40 degrees F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), where applicable.

2) If water or aggregate has been heated above 100 degrees F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.

3) Submit a Cold Weather Concrete Construction Plan, and have it approved prior to concrete placements when the ambient temperature falls below 55 degrees F. This plan shall conform to ACI 306R and shall include but not be limited to the demonstration of how the in situ concrete temperature will be maintained at 55 degrees F and monitored, or at temperatures specified in ACI 306R Table 3.1, whichever is more stringent. The specified concrete properties must be achieved if the minimum curing temperature is maintained at 55 degrees F.

4) Do not mix or place concrete when the ambient temperature is below 35 degrees F within 72 hours, unless fresh concrete is insulated or enclosed and maintained at a minimum of 55 degrees F or in accordance with Table 3.1 of ACI 306.

5) Reinforcement, forms and soils in contact with concrete shall not be frozen and shall be maintained completely frost free. If required, apply heat to raise their temperature to a minimum of 35 degrees F. The use of chemicals to eliminate frost will not be permitted.

b. Hot Weather:

1) The ingredients shall be cooled before mixing if necessary to maintain the temperature of the concrete below the maximum placing temperature required by Article 3.02, Paragraph B.4.c. The temperature of the concrete at initial discharge shall not exceed 85 degrees F. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R), where applicable.

2) Submit a Hot Weather Concrete Construction Plan and have it approved prior to placement when the ambient temperature exceeds 80 degrees F. This plan shall conform with ACI 305R and shall include but not be limited to the demonstration of how the concrete temperature during batching and mixing will be kept below the specified maximum temperature requirements, how the concrete will be protected from rapid evaporation of surface moisture, the proper use of water reducing retarders with re-dosing charts and curing procedures.

3) Do not place concrete when the instantaneous ambient temperature exceeds 85 degrees F.

4) Schedule work such that the concrete placement operations can be performed during the coolest part of the day.

5) Do not place concrete when the rate of surface evaporation exceeds 0.15 lbs/sq ft/hr as defined in ACI 305R Figure 2.1.5.5. If ambient conditions are such that this limit is exceeded, demonstrate methods such as widescreens, fogging or other means so that the concrete evaporative rate is less than 0.15 lbs/sq ft/hr.

c. Under special circumstances, and with written approval of the Supervising Engineer for Concrete Construction, the above provisions as to the initial discharge temperature of the concrete may be modified.

d. Accelerators or retarders may be used with the approval of the Supervising Engineer for Concrete Construction. When permitted,

they shall be used in accordance with "Hot Weather Concreting" (ACI 305R).

8. Mixing Small Quantities of Concrete:

a. Only when permitted by the Supervising Engineer for Concrete Construction, small quantities of concrete may be mixed either by a small manually controlled portable mixer or by hand. In such cases, volumetric measurement of aggregates will be permitted.

b. Concrete shall be hand mixed on a watertight platform. Cement and aggregates shall first be mixed dry until a uniform color is obtained. Water shall then be added and the entire mass turned over at least six times, or until the mixture is uniform and of the required consistency. Not more than one-half cubic yard of concrete shall be hand mixed in any batch.

B. Concrete Placement

1. General:

a. The Contractor shall provide concrete placement including preparation before placing, conveying, depositing, consolidation, weather protection, bonding, underwater concreting, and placing of grout and mortar according to the following requirements.

2. Conveying:

a. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is obtained. Follow the detailed recommendations given in ACI 304R, where applicable.

b. Conveying equipment shall be of size and design to insure a continuous flow of concrete at the delivery end and shall be approved. Conveying equipment and operations shall conform to the following requirements:

1) Conveying equipment shall contain no aluminum components.

2) Truck mixers, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of Article 3.02.A.

3) Belt conveyors shall be horizontal or at a slope which will not cause segregation or loss. Protect concrete to minimize drying and effects of temperature rise. Use an acceptable discharge hopper at the discharge end to prevent segregation. Do not allow mortar to adhere to the return length of the belt.

4) Chutes shall be metal or metal-lined having rounded bottoms and shall have a slope not exceeding 1 vertical to

2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

5) Pump equipment shall be of suitable kind and adequate pumping capacity and shall be subject to approval by the Supervising Engineer for Concrete Construction. Placement shall be controlled so that segregation does not occur in the discharged concrete. Test cylinders for strength and tests for slump, temperature, and air content shall be made on samples of concrete taken at point of discharge from the pump line.

6) The provisions of Article 3.02, Paragraph B.2.b.4 shall apply to placement methods delivering concrete through lines using pneumatic air pressure.

7) The provisions of Article 3.02, Paragraphs B.2.b.4 and B.2.b.5 are not applicable to gunned mortar applications.

3. Depositing:

a. Concrete shall be deposited continuously, or in lifts as specified on the Contract Drawings or as directed by the Supervising Engineer for Concrete Construction, such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for in the drawings or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained. Detailed recommendations are given in ACI 304R, where applicable.

1) Plan placements so that a deposit of concrete on a previous deposit occurs within 30 minutes.

b. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.

c. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.

1) Do not drop concrete freely where reinforcing will cause segregation, nor more than four (4) feet.

d. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for slabs.

e. When underwater placement is required or permitted, place concrete by a method acceptable to the Engineer. Deposit the fresh concrete so the concrete enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete. Placement shall proceed without interruption until concrete has been brought to the required height. Sufficient number of tremies or pumps shall be provided to limit horizontal flow to maximum 10 feet. In advance of placement, provide for Engineer review the methods and equipment intended to be used.

f. Where a surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool so as to bring a full surface of mortar against the form, without the formation of excessive surface voids. All concrete shall be consolidated by internal vibration, spading, rodding, or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness. Use internal vibrators of the largest size and power that can properly be used in the Work. Over-vibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, approximately 18 in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 sec. duration. A spare vibrator shall be kept on the job site during all concrete placing operations. Follow the detailed recommendations given in of ACI 309R, where applicable. Workers shall be experienced in use of the vibrators.

1) External vibration shall only be used when explicitly permitted by the Supervising Engineer for Concrete Construction. Vibrating operations shall be continuous throughout the entire section where concrete is being deposited. Vibrators shall be clamped to the studs or wales or in pairs so that while one is vibrating the other can be shifted to insure constant vibration. External vibration shall conform to the requirements of ACI 309R.

2) The type, number and method of application of vibrators shall be subject to prior approval by the Engineer. Vibrators shall be applied to locations not more than 30 inches apart. The contractor shall have smaller vibrators to use where the

space is limited between the reinforcing bars and formwork. Where spading or rodding is approved in lieu of mechanical vibration, spade coarse aggregates away from the forms into the plastic mass and rod concrete around embedded materials and into corners and spaces to be filled. Vibrators shall not be used to move concrete.

g. Execution:

1) Do not vibrate concrete to the point that large particles of aggregate float to the surface.

2) Do not work concrete to the point that mortar is driven down and an excess of the aggregate appears at the surface.

h. Self-Supporting Floors and Roofs:

1) Reinforced Concrete Beams and Girders shall be cast monolithically with adjoining arches.

2) Canopies, Cornices and Marquees shall be monolithically cast with floor arches, with profiles true to indicated contours. Top surfaces of canopies and marquees shall be pitched to drain. Exposed soffits and edges shall be rubbed with carborundum stone and left clean and true.

4. Protection, Weather, Placing and Preparation of Forms:

a. Concrete placed during rain, sleet or snow, or when the mean daily temperature falls below 40 degrees F or is expected to be below 40 degrees F during placing or within 24 hours thereafter or rises above 90 degrees F shall be adequately protected as provided in Article 3.02, Paragraph C. and approval for placement shall be obtained from the Supervising Engineer for Concrete Construction.

b. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

c. Placing temperature:

1) When the mean daily temperature falls below 40 degrees F, the minimum temperature of concrete as placed shall be 55 degrees F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), and in accordance with NYCBC Section 1905.12, where applicable.

a) During cold weather make provisions in advance of concrete placement to maintain the temperature of the concrete above 55 degrees F. Use heating, covering or other means adequate to maintain the required temperature without injury to concrete due to concentration of heat. Do not use combustion heaters during the first 24 hours unless precautions

are taken to prevent exposure of the concrete to exhaust gases containing carbon dioxide.

2) Concrete deposited in hot weather shall have a placing temperature which will not cause difficulty from loss of slump, flash set, or cold joints. The temperature of the concrete preferably should be less than 80 degrees F and shall not exceed 90 degrees F unless permitted by the Supervising Engineer for Concrete Construction. Loss of slump, flash set, or cold joints due to the temperature of the concrete as placed will not be acceptable. When the temperature of the steel is greater than 120 degrees F, fog the steel forms and the reinforcement with water just prior to placing the concrete. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R) and in accordance with NYCBC Section 1905.13, where applicable.

d. Placing:

1) Adequate skilled personnel and equipment shall be available to handle and place the concrete immediately upon delivery.

2) Dry surfaces shall be wet down before commencing placement of concrete.

3) Temperature of surfaces to receive concrete (earth, forms, reinforcing steel, etc.), should approximate the temperature of the concrete being placed.

4) Evaporation rate of water from freshly placed concrete should be held to a minimum by:

a) Shading of operations.

b) Reducing air circulation in area of operations.

c) Maintaining fog spray during operations.

5) Cold Joints shall be avoided. This can be accomplished by:

a) Providing adequate skilled personnel to handle and place the concrete immediately after its delivery to the forms at an acceptable temperature.

b) Placing in layers thin enough and areas small enough so that vibration or working of the concrete will insure complete union of adjacent layers.

c) Lengthening of setting time by use of approved water reducing retarders.

d) Placing a bulkhead at a suitable point where placement is stopped temporarily.

6) Loss of slump shall be kept at a minimum. This can be accomplished by:

a) Minimum lapse of time between mixing and placing.

b) Avoiding delays in batch mixing and truck dispatching.

c) Job conditions and equipment (chutes, access runs, etc.) being organized to prevent additional mixing.

d) Use of approved water reducing retarders.

e. Preparation of forms:

1) All forms or surfaces (subgrades, reinforcing steel) to receive concrete, in addition to the normal requirements of tightness, soundness, being free of debris, etc., shall be:

a) Protected against excessive air currents.

b) Sprinkled systematically with cool water.

2) Note: Wetting down around the work will cool the surrounding air and increase the humidity, thus reducing temperatures and evaporation from the concrete.

5. Bonding:

a. When specified, the surface of joints shall be prepared in accordance with Section 03 32 00 - Joints in Concrete.

b. The hardened concrete of joints between footings and walls or columns, between walls or columns and beams or floors they support, joints in unexposed walls and all other not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

c. Joints receiving an adhesive shall have been prepared and adhesive applied in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

d. Surfaces of joints which have been obtained by the use of a chemical retarder shall have been prepared in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

6. Concreting Under Water:

a. Placing concrete in water will be permitted only when approved by the Supervising Engineer for Concrete Construction. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved means, and shall not be disturbed after being deposited. Special care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. Underwater formwork shall be reasonably watertight. The

consistency of the concrete shall be carefully regulated and special care shall be exercised to prevent segregation of materials. The method of depositing concrete shall be regulated to produce approximately horizontal surfaces.

b. Tremie Concrete (Underwater):

1) When a tremie is used, it shall consist of a tube constructed in sections having flanged couplings fitted with watertight gaskets with smooth inside and outside surfaces to permit both flow of concrete and unimpeded withdrawal during concreting. Provide a tremie with wall thickness adequate to prevent crimping or sharp bends, which restrict concrete placement. Test the tremie tube joints for watertightness in the presence of the Engineer prior to using it for concrete placement, using a method acceptable to the Engineer.

2) The tremie shall be supported to permit free movement of the discharge end over the entire top surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be entirely sealed at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the pour has been completed. The concrete may be pumped to the tremie location but pumping directly into the placement area/form is not permitted.

3) Start the tremie cement concrete placement either by plugging the top of the tremie pipe with burlap when the tremie pipe is resting on the bottom with the tremie pipe full of water or equipping the bottom of the tremie pipe with an accepted automatic check valve that prevents water from entering the tremie pipe, or by an alternate method approved by the Engineer, that insures continuous flow of concrete without segregation of materials or loss of cement and fines. After filling the hopper and the top of the pipe system with concrete, raise the tremie pipe slightly to push the plug down the tremie pipe to discharge the concrete, or to open the check valve. Keep the discharge end of the tremie pipe continuously submerged in the plastic concrete and continuously filled until the tremie cement concrete placement is completed. Provide sufficient concrete capacity and tremie pipes to place the tremie cement concrete in one continuous operation and at a rate sufficient to keep the

surface of the concrete plastic and flowing over the entire area of placement.

c. When a bucket is used to place concrete in water, it shall have a capacity of not less than 1/2 cubic yard.

7. Protection and Cleaning of Exposed Structural Steel:

a. The Contractor shall take all necessary precautions to prevent mortar and concrete splashes on the steel. The Contractor shall exercise care to prevent abrasion or scuffing of the paint on the structural steel while concrete is being formed, placed or stripped.

b. The Contractor shall thoroughly clean the structural steel of all concrete drippings or other foreign matter that may have been deposited on the steel or on any other part of the structure as a result of his operations. All the work involved in thoroughly cleaning the steel shall proceed before concrete drippings have hardened. Immediately after the concrete has been placed, the Contractor shall clean the steel with water and/or such other additional means subject to the approval of the Supervising Engineer for Concrete Construction as may be necessary to remove all mortar, concrete and other foreign matter that has been dropped, dripped, splashed or otherwise deposited on the steel as a result of his operations. It will be the Contractor's obligation and responsibility to remove all foreign matter to the satisfaction of the Supervising Engineer for Concrete Construction.

c. After formwork has been removed, any concrete or other foreign material that may have been previously missed and that still remains on the steel shall be removed.

8. Concrete finishes shall conform to the requirements of Section 03 35 00 - Concrete Finishing.

9. Sequencing: Construct spillway placements in alternating panels and allow concrete to cure a minimum of 3 days prior to placement of adjacent work. Limit depth of spillway placements to 6 feet and allow a minimum of 3 days of curing before placement of overlying concrete.

C. Concrete Curing and Protection

1. General:

a. Protect all freshly deposited concrete from premature drying, from weather elements, from defacement, from flowing water, and from mechanical injury. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

b. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for

maintaining the concrete in a moist condition for at least a 14-day period for 40M and 25 concrete and at least a 7-day period thereafter for all other Classes of concrete. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

c. At least one person shall be on duty during concrete placement, curing, and protection charged with the sole responsibility of concrete curing and protection including operating the water system to maintain the entire surface moist condition during the curing period, and maintaining the insulation blankets or heated enclosures as necessary to maintain concrete temperatures and temperature differentials within the specified tolerances.

d. See Article 3.02, Paragraph D.5 for modifications to these curing requirements for all Class 40M concrete.

e. Additionally, concrete curing shall be in accordance with NYCBC Section 1905.11.

2. Curing Methods:

a. For Class 40M concrete, curing shall be performed by continuous fogging or sprinkling, or by application of mats or fabric kept continuously wet. If used, mats or fabric kept continuously wet shall not be covered with any other materials that would prevent easy visual confirmation of the wet curing unless insulation is required during cold weather protection. Forms shall be stripped from the concrete as soon as allowable by these specifications and wet curing shall be initiated.

b. For all Classes of concrete except Classes 40M and 25, the Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.

1) Ponding or continuous fogging or sprinkling.

2) Application of mats or fabric kept continuously wet.

3) Continuous application of steam (under 150 degrees F).

4) Application of sheet materials conforming to ASTM C 171.

5) If approved by the Engineer, application of a curing compound in accordance with Article 3.02, Paragraph C.7.

3. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in Article 3.02, Paragraph C.2.

4. Any of the curing procedures used in Article 3.02, Paragraph C.2 may be replaced by one of the other curing procedures listed in Article 3.02, Paragraph C.2 after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

5. Curing Concrete under Cold Weather Conditions:

   a. Curing under cold weather conditions shall conform to the requirements of ACI 306R.

   b. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete. Additional cylinders may be necessary to demonstrate that form removal requirements are met.

   c. The methods of protecting the concrete shall be approved by the Engineer and shall prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.

6. Curing Concrete under Hot Weather Conditions:

   a. When air temperatures exceed 85ºF, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, in addition to generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

   b. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing, consisting of methods listed in Article 3.02, Paragraph C.2.b.1 or C.2.b.2, is mandatory for at least the first 24 hours. Method specified in Article 3.02, Paragraph C.2.b.2. may be used only if the finished surface is not marred or blemished during contact with the coverings.

   c. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least five (5) additional days using one of the methods listed in Article 3.02, Paragraph C.2.

   d. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305R.

7. Use of Curing Compound:

   a. Curing compound shall not be used on surfaces to receive subsequent coatings. Curing compound shall not be used on surfaces

exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

b. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.

c. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not exceed 300 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

8. Early Termination of Curing:

a. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

1) The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

2) The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

3) Tests are made of cylinders kept adjacent to the structure and cured by the same methods and reach 70 percent of the specified compressive strength f'_c as determined in accordance with ASTM C 39.

9. Protection:

a. Floors which have received their final finish shall be closed to all traffic for at least 48 hours following the completion of trowelling. Thereafter, before the floor is subjected to any traffic, it shall be covered with paper covering meeting the requirements of ASTM C 171. This protection shall be maintained as long as necessary to avoid damage to the floor.

b. During the curing period, and thereafter as conditions may require, the concrete shall be protected from damaging mechanical disturbances, particularly excessive load stresses, heavy shock, and excess vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

c. Following removal of protective paper, the surface shall be protected from painting and other work. All stains shall be removed.

D. Mass Concrete

1. Concrete sections 4 feet or more in the least dimension and any concrete listed in Article 1.05, Paragraph A.3 are termed mass concrete and shall conform to the special provisions of this article in addition to all applicable provisions of other articles in this Section. Mass concrete proportioning, placement, consolidation and curing shall be in accordance with ACI 304R, 309R, 211.1, and 207.1R.

2. Additional requirements for heating, cooling, curing and protecting concrete sections more than 6 feet in the least dimension shall be as specified in the Contract, if applicable. Consideration shall be given to temperature rise caused by the hydration of the cement. Large differences in temperature within the concrete shall be avoided.

3. Proportioning and Mix Design:

a. Materials and mix proportioning for mass concrete shall be in accordance with ACI 207.1R - Mass Concrete, latest edition. Type III Portland cement and accelerating type admixtures shall not be used.

b. Selection of concrete aggregates for mass concrete is of paramount importance to the quality of the concrete and to the economy and durability of the structure. Aggregates shall conform to the requirements of ASTM C 88, C 227, and C 1260 and as specified in this Section. Aggregate size shall be in accordance with ASTM C33 and Table 1.

c. The selection of the mix design should recognize that serious volume change stresses can be avoided by controlling the temperature drop of the concrete from the maximum to ambient. Avoidance of thermal shock is important in preventing surface cracks due to temperature gradients. The maximum internal temperature will depend upon the initial concrete temperature and the type and quantity of cementitious materials used. See section 3.02.D.5.c.2) for additional information.

d. Mixes shall be designed using types and amounts of cement which will reflect lower internal temperatures. Optimum cement is only obtainable by aggregate proportioning that reduces the volume of the void spaces and depends upon aggregate gradation. Minimum cement factors with maximum size aggregate, air entrainment and low water cement ratios should be used, to produce workable concrete and the specified strength.

4. Placement:

a. Class 40M concrete shall be proportioned and placed within the slump limits as specified in Article 2.03, Paragraph A.4.

b. Placing Temperatures - The temperature of the concrete when deposited at the point of placement shall not exceed 70 degrees F, nor be less than 35 degrees F. When the temperature of the surrounding air is expected to be below 40 degrees F during placing, or within 24 hours thereafter, or conditions classify as "cold weather" as defined in ACI 306R.1, the temperature of the concrete when deposited at the point of placement shall be in accordance with temperature requirements for cold weather concreting listed in ACI 306R.1.

c. Concrete shall not be placed until the installation of the temperature monitoring system has been inspected and approved by the Engineer and adequate materials for the curing and thermal protection of the concrete are on the site.

d. Sequencing - Construct mass concrete in alternating placements that are separated by a minimum time delay as follows. (To clarify with an example, if Contractor is required to "delay 3 full calendar days" and first placement is completed late in the day on Monday, the adjacent placement shall be delayed until at least early Friday).

1) For placements that are horizontally adjacent to one another and separated by a construction joint, delay 4 full calendar days, minimum, before placing adjacent concrete.

2) For placements that are horizontally adjacent to one another and separated by a transverse contraction joint, delay 2 full calendar days, minimum, before placing adjacent concrete.

3) For vertically adjacent placements (i.e., horizontal construction joints), limit depth of placements to no more than 6 feet and delay 3 full calendar days before placing overlying concrete.

4) Where the following two conditions are both met, Contractor may relax the above limits to delay only 2 full calendar days between adjacent placements at either horizontal or vertical construction joints:

a) Placement depths are limited to 3 feet vertically, and

b) Average daily temperature is 55 degrees or less for a period of at least three (3) consecutive days when the placement will occur.

5. Curing and Protection: The curing requirements previously specified in this Section shall apply to mass concrete as modified in this article:

a. The curing period shall be a minimum of 14 days. Curing shall be performed by continuous fogging or sprinkling, or by application of

mats or fabric kept continuously wet. If used, mats or fabric kept continuously wet shall not be covered with any other materials that would prevent easy visual confirmation of the wet curing unless insulation is required during cold weather protection. Forms shall be stripped from the concrete as soon as allowable by these specifications and wet curing shall be initiated.

b. Temperature Monitoring:

1) Thermocouples or thermistors shall be installed in mass concrete placements in sets of two located within each concrete placement of the spillway crest concrete and in any concrete placements on the spillway steps that exceed 3 feet thick in their least dimension. One thermocouple shall be placed at mid-depth and mid-width of the concrete placement and the second thermocouple shall be located directly adjacent (horizontally) from the first and 2 inches inside the surface.

2) Each wire lead, if wired thermocouples are used, shall extend a minimum of 6 feet out of the concrete and shall be securely labeled with the location of the corresponding sensor and a tracking number.

3) Placement plans showing all temperature sensors and manufacturer's installation instructions and operating manuals for all related equipment shall be submitted to the Engineer for approval prior to concrete placement.

4) Temperature monitoring shall continue during the curing period and until the internal temperature is within 25 degrees F of the ambient air temperature following the end of the curing period, based on a 5-day running average of average daily ambient air temperature. Temperature monitoring shall be performed once daily at each thermocouple consistently between the hours of 6 a.m. and 10 a.m.

c. Thermal Control:

1) At mass concrete placements, the curing water added shall not be colder than 30 degrees F below the interior temperature of the concrete. If necessary, curing water shall be heated.

2) For mass concrete, large differentials of temperature between the interior of the concrete and the exterior of the concrete shall be avoided. The maximum allowable temperature differential between the interior of the concrete (core) and the exterior of the concrete (near-surface thermocouple) shall not be more than 35 degrees Fahrenheit. When the difference in temperature between the core and the

surface (horizontally) exceeds 30 degrees Fahrenheit, insulation blankets shall be added in 1/2 inch layers as needed to prevent the difference from increasing. Joints in insulation blankets shall be staggered a minimum of 12 inches at adjacent layers. Insulation blankets shall be placed over curing mats and moisture retaining cover. If the addition of layers of insulation are not sufficient to limit the temperature gradient to 35 degrees Fahrenheit, the concrete placement shall be tented and heat shall be applied as needed to control the temperature gradient.

3) Thermal controls and protection shall be maintained until the interior concrete temperature is less than 35 degrees Fahrenheit greater than the average daily ambient air temperature (average of daily high and low temperatures), based on a 5-day running average.

4) The rate of cooling within the interior of the concrete shall be regulated to control the temperature drop to not more than 1 degree Fahrenheit in any period of one hour and 10 degrees Fahrenheit in any 24-hour period.

5) Where insulation blankets are provided over mass concrete, at the end of the curing period they shall be removed one layer at a time at such a rate that the temperature differential between the core and the near-surface thermocouple never exceeds 35 degrees Fahrenheit and the cooling rate specified above is not exceeded, but not more than one layer in an 8 hour period.

d. At least one person shall be on duty during concrete placement, curing, and protection charged with the sole responsibility of concrete curing and protection including operating the water system to maintain the entire surface moist during the curing period, monitoring and recording thermocouple data and ambient temperatures, and maintaining the insulation blankets or heated enclosures as necessary to maintain concrete temperatures and temperature differentials within the specified tolerances.

E. Concrete Repairs

1. Repair of Formed Surfaces:

a. The following defects shall be repaired in all types of formed finishes:

1) Spalls, air bubbles, rock pockets, form depressions, and other defects which are more than 1/4 inch in depth.

2) Holes from tie rods and other form tie systems.

3) Fins, offsets and other projections which extend more than 1/4" beyond the designated member surface.

4) Structural cracks, as defined by the Engineer.

5) Non-structural cracks, as defined by the Engineer, which are greater than 0.010 inches wide. In water retaining members, elevated slabs subject to rainfall and washdown, and below grade members, any crack which shows any amount of leakage. Where it is not possible to verify that a crack is not leaking, it shall be repaired.

6) Stains and substances marring the surface.

b. The following defects shall be repaired in smooth finish surfaces, in addition to those listed above:

1) Spalls, air bubbles, rock pockets, form depressions, and other defects which extend to more than 1/2" in width in any direction, no matter how deep.

2) Spalls, air bubbles, rock pockets, form depressions, and other defects of any size which exceed 3 in number in a 12 inch square or 12 in number in a 3 foot square.

3) Fins, offsets and other projections shall be completely removed and smoothed.

4) Scratches and gouges in the surface.

5) Surfaces that exceed allowable tolerances.

6) Texture and color irregularities. At water retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below the minimum normal operating water surface except where such defects are indicative of reduced durability.

c. Where a smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to the finish application, when approved by the Engineer.

2. Method of Repair of Formed Surfaces:

a. Repair and patch defective areas with cement mortar or concrete repair mortar immediately after removal of forms and as directed by the Engineer.

b. Repairs made to water bearing and below grade surfaces shall be made with repair mortar only. Repairs of form tie holes in water bearing or buried surfaces shall be made with non-shrink grout as specified in Section 03 60 00 - Grouting.

c. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1 inch for cement mortar and 1/2 inch for repair mortar. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean and brush-coat the area to be patched with the specified bonding agent. Where concrete repair mortar is used, the surface shall be prepared and mortar placed per manufacturers recommendations. Compact mortar in place and strike off slightly higher than the surrounding surface. Cure as specified.

d. Repairs to surfaces exposed to public view shall match the color and texture of surrounding concrete.

e. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching.

f. Structural cracks shall be pressure grouted using epoxy injection in accordance with the manufacturer's directions and recommendations.

g. Non-structural cracks shall be pressure grouted using hydrophilic resin in accordance with the manufacturer's directions and recommendations.

h. Fill holes extending through concrete by means of a plunger- type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure completely filling.

i. Remove stains, grout accumulations, sealing compounds, and other substances marring surfaces by scrubbing, power washing, or abrasive blast using sand finer than No. 30 and air pressure from 15 to 25 psi.

3. Repair of Unformed Surfaces:

a. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish according to ACI 117. Correct low and high areas as herein specified.

b. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

c. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects include crazing, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

d. Repair structural cracks as defined by the Engineer in all structures.

e. Repair non-structural cracks as defined by the Engineer which are greater than 0.01 inches wide, which are in below grade structures, or which are exposed to public view. In water retaining structures, repair any crack which shows any amount of leakage and all cracks where leakage potential cannot be determined.

4. Methods of Repair of Unformed Surfaces:

a. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

b. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where the concrete has already set and repairs are required, sawcut around the perimeter of the area to be repaired to a 1/2-inch depth and remove concrete so that the minimum thickness of the repair is 1/2 inch. Apply specified concrete repair mortar in accordance with the manufacturer's directions and recommendations.

c. Remove defective areas to sound concrete with clean, square cuts, to a minimum depth of 1.5 inches. Provide 1 inch clearance all around exposed reinforcing steel. Clean and dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete while the bonding agent is still tacky. Mix patching concrete of the same materials and proportions to provide concrete of the same type or class and color as the adjacent finished concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

d. Repair isolated random non-structural cracks in members which are not below grade or water retaining, and single holes not over 1 inch diameter, by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack grout before the cement grout takes its initial set. Mix dry-pack grout as specified in Section 03 60 00 - Grouting, Grout. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

e. Structural cracks shall be pressure grouted using an epoxy injection system. Apply in accordance with the manufacturer's directions and recommendations.

f. Non-structural cracks in below grade and water retaining structures shall be pressure grouted using hydrophilic resin. Apply in

accordance with the manufacturer's directions and recommendations.

g. Where flooring material is to be installed, assure that surface is acceptable for flooring material to be installed in accordance with manufacturer's recommendations.

5. Other Methods of Repair:

a. Repair methods not specified above may be used with written approval of the Engineer.

F. Placing, Curing, Finishing Exposed-to-View Concrete

1. Final surface presentation shall be free of lift line discoloration and discolorations caused by improper placement procedures and shall have minimal surface voids and be free of void concentrations as required in Section 03 35 00 – Concrete Finishing.

G. Shotcrete

1. Shotcrete is concrete or mortar pneumatically projected at high velocity onto a surface. Shotcrete proportioning, placement, curing and testing shall be in accordance with NYCBC Section 1911, where applicable.

2. For projects where NYCBC is not applicable, ACI 506R and 506.2 guidelines shall be followed.

H. Environmental Controls

1. Perform all operations in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements, Section 01 35 63.01 – Sustainability Requirements, Section 01 74 20 – Construction Waste Management, and Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control. Provide a spill kit and containment system for concrete work area.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Quality Control Testing:

1. General:

a. Unless required otherwise by the Contract, all field quality control testing of materials and the resulting concrete for compliance with the technical requirements of the specifications shall be performed by the Division of Design Services of the Bureau of Engineering Design and Construction and/or it's QA/QC Consultant.

b. The use of these, or any, testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Contract. The Contractor shall provide concrete of the quality specified and it is hereby emphasized that the responsibility for so doing is solely and completely his. It shall be the Contractor's responsibility to work with the Supervising Engineer for Concrete Construction and the DEP designated Testing

Laboratory and to keep himself fully informed of the Evaluation of the Compression Test results as described in Paragraph 3.03 B.

2. Testing Requirements

a. Secure production samples of materials at plants or stockpiles during the course of the work and test for compliance with the specifications unless otherwise noted in the Schedule of Mixes Proportioning and Testing stipulated in the Contract.

b. Provide the services of a qualified concrete technician at each location on the job site where concrete is being mixed and discharged from the mixer for the duration of the concrete placement.

c. Strength Tests: Strength tests of the concrete shall be conducted in accordance with ASTM C39 and the following procedures:

1) Secure composite samples in accordance with ASTM C 172.

2) Each strength test shall be obtained from a different batch of concrete on a representative, truly random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

3) Additional concrete test cylinders shall be made from concrete taken out of the bucket, hopper or forms as directed by the Supervising Engineer for Concrete Construction. These test cylinders shall be separate and distinct from those made from the mixer and shall be made from the same batch as the sample taken from the mixer. Where concrete is placed directly from the mixer into forms, without any intermediate conveyance, these additional cylinders will not be required.

4) When pumping or pneumatic equipment is used, samples shall be taken at the discharge end.

5) When the strength in Table 1 is specified at an age of 28 days, compressive strength tests shall be conducted on a set of seven specimens molded from each sample in accordance with ASTM C31, and cured under standard moisture and temperature conditions in accordance with ASTM C 31. Two shall be tested at 7 days, and three shall be tested at 28 days. Two specimens (spare) to be tested at 56 days only if needed.

6) When the strength in Table 1 is specified at an age of 90 days, compressive strength tests shall be conducted on a set of nine specimens molded from each sample in accordance with ASTM C31, and cured under standard moisture and

temperature conditions in accordance with ASTM C 31. Two shall be tested at 7 days, two shall be tested at 28 days, and three shall be tested at 90 days. Two specimens (spare) to be tested at 180 days if needed.

7) Test two specimens at 7 days in accordance with ASTM C 39.

8) When the strength in Table 1 is specified at an age of 28 days, test three specimens at 28 days in accordance with ASTM C 39. The 28-day test result shall be the average of the strengths of the three specimens, except that if one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen in a test show any of the above defects, the entire test shall be discarded.

9) When the strength in Table 1 is specified at an age of 90 days, test two specimens at 7 days, two specimens at 28 days and 3 specimens at 90 days in accordance with ASTM C 39. The 7-day, 28-day and 90-day test results shall be the average of the strengths of the individual specimens, except that if one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded. Should more than one specimen in a test show any of the above defects, the entire test shall be discarded.

10) When the strength in Table 1 is specified at an age of 28 days, if the 7-day test results are below 65% of the specified strength and/or whenever the 28-day test results are below the specified strength, the specimens shall be kept intact and stored for a minimum of 30 days or until inspected by both the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

11) When the strength in Table 1 is specified at an age of 90 days, if the 90-day test results are below the specified strength, the specimens shall be kept intact and stored for a minimum of 30 days or until inspected by both the Supervising Engineer for Concrete Construction or his authorized representative and the contractor.

12) Written results of the compression test results shall be posted on the DEP's concrete database 24 hours following the test date on the following business day. The test results are available to the Supervising Engineer for Concrete Construction, the Engineer, Contractor and concrete supplier. A hard copy of the final result will be sent to the Resident Engineer.

13) Unless otherwise directed, all cylinders shall only be handled by DEP designated personnel.

14) When the strength in Table 1 is specified at an age of 90 days, the strength shall be tested at 7, 28, and 90 days as specified above until at least 20 sets of field cylinders have been tested at 90 days and a good correlation has been established between the 28-day and 90-day compressive strength. Thereafter, testing can be reduced for nine out of every ten cylinder sets as specified for 28-day strength mixes (7 total cylinders per set) and the 90-day strength will be estimated based on the established correlation, except the two spares shall be tested at 90 days if necessary. At least one out of every ten cylinder sets shall continue to be tested as specified above for 90-day strength mixes (9 cylinders per set). If at any time the mix ingredients change or the correlation between 28-day and 90-day strengths changes based upon ongoing testing, then all cylinder sets shall be tested at 90 days (9 cylinders per set) until the reason for the change has been identified and a new correlation between 28-day and 90-day strengths has been established to the satisfaction of the Engineer.

d. Other Required Tests:

1) Check the slump, air content, concrete temperature, unit weight, yield, and water content of each sample of concrete to be used in molding strength test specimens.

2) Perform all other field testing of concrete as required by the New York City Building Code.

3) Slump testing shall be conducted in accordance with ASTM C 143.

4) Air content testing shall be conducted in accordance with either ASTM C 231 (Pressure Method) or ASTM C 173 (Volumetric Method) on concrete samples from which the compressive strength test specimens are made. Note that the chase indicator is not the approved ASTM volumetric test method.

5) Additional tests of air content shall be performed on a regular and frequent basis for control as directed by the Supervising Engineer for Concrete Construction. A Chase indicator, calibrated at least once daily against the readings for air content obtained by methods outlined in Article 3.03, Paragraph A.2.d.4, may be used for additional testing. Use of the Chase Indicator alone will not be considered as having

met the requirements of Article 3.03, Paragraph A.2.d.1 for checking air content.

6) Measurements of concrete temperature shall be performed in accordance with ASTM C 1064.

7) Unit Weight tests shall be made with a calibrated one-half (1/2) cubic foot bucket in accordance with ASTM C 138. On obtaining the unit weight, the yield shall be immediately computed as the ratio; weight of all the ingredients batched including the water added per cubic yard (from the batching ticket) divided by the unit weight determined times 27. Over-yielding or under-yielding by more than 2% are cause for concern and should be immediately investigated.

8) Water content testing shall be conducted in accordance with AASHTO TP 23.

9) Properly note and record the time of day when all tests were made and the corresponding results. Also, record from what truckloads the samples were taken, the class of concrete which the samples represent and exactly where the concrete represented by the sample was deposited in the structure.

10) Trial Batching and Test Placement Verification: The Department may perform the following additional tests to verify trial batches submitted by the Contractor to ensure compliance with the Contract Documents:

    a) Bond strength.

    b) Chloride Ion concentration: The acid soluble chloride ions by weight of cementitious material in the concrete mix shall be less than or equal to 0.10% for reinforced concrete, and 0.08% for pre-stressed concrete as per ACI 222R. The water soluble chloride ions by weight of cementitious material in the concrete mix shall be less than or equal to 0.08% for reinforced concrete and 0.06% for pre-stressed concrete.

    c) Flexural strength.

    d) Gradation and moisture content for both fine and coarse aggregates in accordance with ASTM C 136 and ASTM C 566 respectively. Perform both tests prior to production and every three (3) hours during production or every 100 cubic yards of concrete, whichever is longer in time, and whenever aggregates are used from a new stockpile that has not been tested for gradation or moisture content.

e) Permeability by the Coulomb Test: To evaluate the permeability of the concrete, the Upper Quality Limit (UQL) shall be 1700 Coulombs for mixes without a corrosion inhibitor and 2200 Coulombs for mixes containing a corrosion inhibitor, as tested by AASHTO T277 after a 28 day wet cure. For mixes containing only fly ash or slag (no silica fume) permeability will be evaluated at 90 days using the same performance requirements stated above.

f) Shrinkage.

g) Water content of freshly mixed concrete/Microwave Oven Drying Test.

e. Frequency of Testing:

1) The minimum number of tests shown in the following table will be made for concrete used for all structures.

Total Cubic Yards of Concrete Placed During Day	Minimum Number of Strength Tests
Up to 100	One for each 50 Cu. Yds.*
Over 100 Cu. Yds.	One for each 100 Cu.Yds.*
* or fraction thereof.	

2) The Supervising Engineer for Concrete Construction may require that additional tests be made.

f. Additional Services: The DEP provided testing agency shall provide additional services to the extent deemed necessary by DEP and may also perform the following services.

1) Inspect concrete batching, mixing, and delivery operations in accordance with Inspection Requirements of the administrative building code of the City of New York.

2) Check batching and mixing operations.

3) Review the manufacturer's report of each shipment of the cementitious materials, aggregates, chemical admixtures, and reinforcing steel and/or conduct laboratory spot checks of these materials as received.

4) Sample concrete at point of placement and other locations directed by the Supervising Engineer for Concrete Construction and perform required tests.

5) Additional testing of materials or concrete occasioned by failure to meet specification requirements. When required, such testing shall be performed at the Contractor's expense.

3. Authority and Duties of the DEP provided Special Inspection Testing Agency:

   a. Special Inspections of concrete shall be in accordance with NYCBC Table 1705.3.

   b. Technicians representing the testing agency shall inspect the materials and the manufacture of concrete and shall report their findings to the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

   c. When it appears that the material furnished or work performed by the Contractor fails to fulfill specification requirements, the technician shall immediately notify the Supervising Engineer for Concrete Construction or his authorized representative, and the Contractor of such failure.

   d. The technician shall not act as foreman or perform other duties for the Contractor.

   e. Technicians are not authorized to revoke, alter, relax, enlarge or release any requirement of the specifications, nor to approve or accept any portion of the work.

4. Responsibilities and Duties of the Contractor: The Contractor shall be responsible for all phases of quality control of the concrete produced under this contract, including the design of concrete/grout mixtures and the preparation and testing of trial batches prior to and during concrete work. The Contractor shall also comply with the following:

   a. Submit data and test documentation on materials and mixture proportions including trial batch and shrinkage test results to the Engineer at least 60 business days prior to the start of concrete work. No concrete shall be placed until the mixture proportions are approved.

   b. Submittal to the Supervising Engineer for Concrete Construction the procedures, methods and concrete mix designs the Contractor proposes to use, the name and location of the particular plant that will be supplying this mix and make written request for approval in accordance with the requirements of ACI 211.5R.

   c. Submit the quality control programs of the concrete and material suppliers, and provide copies of all test reports to the Engineer in accordance with Article 1.07 – Submittals.

   d. Provide all materials, labor and equipment necessary to assist the representatives of DEP's testing agency in obtaining, preparing and handling test samples at the project site or at other sources of

material sites. Provide space for storing cylinder molds and other equipment, and a suitable location to do limited onsite testing, such as aggregate gradations, moisture content testing, etc. When directed by the Engineer, the Contractor shall be responsible for transferring strength test specimens from point of casting to an approved on-site facility and/or to testing agency vehicles.

e. The Contractor shall notify the Resident Engineer and the Supervising Engineer for Concrete Construction and the DEP provided Testing Agency in writing, of the location, volume, mixture design, the batch plant location and other pertinent information for each placement 24 hours in advance of the placement.

f. Provide and maintain adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for up to 72 hours in compliance with ASTM C 31 or longer or as required by the Engineer. The Contractor shall provide a sufficient number of insulated standard curing boxes or equivalent facility with all appropriate amenities to provide for initial field curing at the site and to properly accommodate the volume of cylinders. This facility shall conform to the requirements of ASTM C 31 for use in storing cylinders on the site until such time as they are transported to the testing laboratory. The boxes shall be large enough to accommodate the maximum number of test cylinders which may be required for any day's concrete placement, and shall have an insulated hinged cover. Heating and / or cooling facilities shall be installed in the box such that the temperature within the box may be maintained at the limits of 60° F to 80° F (or 68° F to 78° F if the design compressive strength of 6000 psi or greater is required) as specified by ASTM C 31. During hot weather when the ambient temperature is greater than 80° F, the temperature of the concrete specimens must be kept to within ACI C31 limits, which may require immersing the specimens in a water bath. Cover the water bath to prevent direct sunlight from raising the water bath temperature. Completely remove and replace the water in the bath every day.. The boxes shall be of such dimensions as to permit placing the cylinders in the boxes one (1) high only. No stacking of cylinders is permitted. A high-low thermometer shall be placed in the storage boxes and the maximum and minimum temperatures noted shall be recorded during the progress of the Work. To minimize the hazard of disturbance during curing, the storage boxes shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete shall be delivered on the site until such storage curing boxes have been provided Cylinders shall remain in the curing boxes until ready for delivery to the testing laboratory.

g. The Contractor shall furnish copies of mill test reports of all shipments of cement, aggregates and reinforcing steel being used to Supervising Engineer for Concrete Construction and the testing agency.

h. The Contractor shall be responsible for:

1) All testing associated with the evaluation proposed mix designs including required trial batch and shrinkage testing.

2) Establishing and controlling the mix proportions during the entire progress of the work in accordance with Article 2.02, Paragraph D.

3) Testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as, any extra testing of concrete or materials occasioned by failure to meet specification requirements.

i. The Contractor shall maintain a level of Quality Control sufficient to consistently achieve the contract specified and required results in both the General and Detailed Specifications and Contract Drawings.

j. All documentation of Quality Control activities including test results and other information such as mill test certificates for all cementitious material shall be made available to the Engineer at all times.

5. The Engineer must be notified immediately whenever QA or QC results are below the contract requirements.

a. All personnel performing concrete testing shall be certified ACI Grade 1 Concrete Laboratory Testing Technicians or Concrete Field Testing Technicians.

B. Evaluation of Concrete Quality:

1. General:

a. Concrete quality shall include but not be limited to satisfactory strength, durability, density (air entrainment), wearing quality, shrinkage cracks, color, physical appearance etc.

b. Wherever there is evidence that any of the concrete in place does not appear to produce the results required by the specifications, such concrete shall be considered questionable and evaluations shall be made as detailed below.

2. Evaluation of Compressive Test Results:

a. Test results shall be evaluated separately, for each type and each specified strength of concrete. Evaluation shall be in accordance with the ACI 214R.

b. The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

1) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds the specified compressive strength f'c.

2) No individual strength test (average of two cylinders) falls below the specified compressive strength f'c by more than 500 psi when f'c is 5,000 psi or less, or by more than 0.10 f'c when f'c is more than 5,000 psi. The strength level of the concrete will be considered satisfactory as long as the averages of all sets of three consecutive compressive strength test results equal or exceed the specified compressive strength f'c and no individual strength test result falls below the specified compressive strength f'c by more than 500 psi.

c. For evaluation of the control of the quality and uniformity, each type and specified strength of the concrete shall be represented by at least five (5) tests.

d. If results of a number of consecutive seven (7) day tests (7-day or 28-day for concrete with a specified strength at 90 days) at any stage of the work indicate abnormalities or results of a number of twenty-eight (28) day tests (90-day for concrete with a specified strength at 90 days) are below the specified strengths, the production and testing of the concrete shall be immediately investigated and reported upon by the Evaluation Committee noted in Article 3.03, Paragraph B.5. It is emphasized that the report of the Evaluation Committee is advisory. The responsibility for the production of the concrete and the decision as to how to proceed with the work remain with the Contractor. However, the decision as to how to proceed is subject to review and approval by the Commissioner.

3. Evaluation of Questionable In-Place Concrete Construction by Non-destructive Methods:

a. Visual inspection, impact hammers, sonoscopes, microscopic examination, chemical analysis of the hardened concrete, probes or other nondestructive testing devices may be used as an indicator of the relative quality and uniformity of various areas of the structure, as an aide in evaluating concrete in place, or in determining locations of areas to be cored. Any program of nondestructive testing shall be performed as directed by and under the supervision of the Evaluation Committee noted in Article 3.03, Paragraph B.5. Test results of any program of nondestructive testing and recommendations based thereon shall be reported by the Committee to the Commissioner prior to the commencement of any other

program of further testing, if recommended or required. All viewpoints if there is no complete agreement, shall be noted in the report.

b. Nondestructive Tests:

1) Test results shall be evaluated and shall be valid only if tests have been conducted by properly calibrated equipment in accordance with recognized standard procedures.

2) Nondestructive tests shall not be used as the sole basis for accepting or rejecting concrete.

4. Evaluation of Questionable In-Place Concrete Construction from Core Tests:

a. Core tests shall be conducted only as recommended and directed by the Evaluation Committee noted in Article 3.03,Paragraph B.5 and only after a program of nondestructive testing as noted in Article 3.03,Paragraph B.3. Core tests shall be evaluated and shall be valid only if tests have been conducted in accordance with specified procedures.

b. When core testing is required, cores shall be obtained and tested in accordance with ASTM C 42. Cores shall be tested saturated-surface-dry or shall be tested air-dry depending as to whether the area where the questionable concrete is located shall be wet or dry under service conditions. Such determination shall be made by the Committee and they shall direct the condition of the cores at the time of testing. If the cores are to be tested dry, they shall be air dried (temperature 60 to 70 degrees F and relative humidity less than 60 percent) for seven (7) days before the test. If the cores are to be tested wet, they shall be tested after moisture conditioning in accordance with ASTM C 42. The laboratory report shall state whether the cores were tested saturated-surface-dry or surface-dry.

c. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Committee so as to least impair the strength of the structure.

d. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, or is obviously defective, replacement cores shall be taken.

e. Concrete in the area represented by a core test, made and tested in accordance with the specified requirements above will be considered adequate for structural strength if the average strength of the three cores taken from the immediate area of the questionable concrete is equal to or greater than the specified strength and no single core strength is less than 85 percent of the specified strength (f'c).

f. The Committee shall determine the area where the cores are to be taken and they shall determine the number of cores to demonstrate the adequacy of the questionable concrete. Corrections to the strength values shall be made if the length to the diameter ratio is different from two. No strength correction shall be made for the age of the concrete cores.

g. If the average strength of the cores as tested is less than the required value, the Committee will make a recommendation as to whether the values obtained are acceptable or they will recommend that the values obtained be checked against a structural analysis as covered in Paragraph 3.03 C.

h. Core holes shall be plugged solid as specified.

5. Evaluation Committee:

a. The following shall constitute a Committee for the investigation and the evaluation of the quality of the concrete when there are indications that the requirements of Paragraph 3.03 B are not being met. The Resident Engineer (who shall act as Chairman of the Committee), the Supervising Engineer for Concrete Construction or authorized representative, representatives of the Contractor, the Concrete Producer, the Testing Agency, the Architect/Engineer responsible for the design and such other members as the Commissioner may designate. Such members of the Committee as designated by the Chairman shall meet whenever request for such meeting is made by any member and/or as otherwise specified. Reports and recommendations of the Committee shall be submitted to the Contractor and the Commissioner. All viewpoints, if there is no complete agreement shall be noted in the report and reports shall be countersigned by all participating members of the Committee. The Contractor shall be responsible for the preparation and submission of reports.

b. The functions of the Committee and any reports, recommendations, etc., it submits shall be advisory in nature. The responsibility for the production and quality of the concrete remains solely and completely with the Contractor.

c. All expenses incurred due to the functioning of the Committee shall be borne by the Contractor except that all members of the Committee shall serve without fee.

6. Additional Curing:

a. If the concrete fails to meet the specified compressive strength requirement, additional curing as specified by the Supervising Engineer for Concrete Construction may be required and modifications may be required in the concrete mix design for the

remaining concrete work, at the expense of the Contractor, in addition to the measures outlined in Article 3.03, Paragraph B.

7. Acceptance of Concrete:

a. Concrete Strength:

1) Concrete not meeting the requirements of Article 3.03, Paragraph B.2 shall be considered potentially deficient. Steps shall be taken to increase the strength to ensure that the strength level will be satisfactory. For potentially deficient concrete, see Article 3.03, Paragraph C.

b. Air Content:

1) Concrete not within the specified limits of air entrainment and tested in accordance with Article 3.03, Paragraph B shall be rejected.

2) Steps must be made to control the proper air content.

c. Slump:

1) Concrete not within the specified slump limits at the point of placement may be rejected.

2) When the concrete is tested and found to be out of specifications the Contractor shall immediately adjust the mix to bring the mixture within the specified slump limits.

C. Acceptance of Structure:

1. General:

a. Notwithstanding the provisions of any section of this Contract, all concrete shall conform to the requirements of the New York City Building Code.

b. Completed concrete work which meets all applicable requirements will be accepted without qualification.

c. Completed Concrete work which fails to meet one or more requirements shall be considered potentially deficient. Potentially deficient concrete which has been repaired to bring it into compliance will be accepted without qualification. The decision as to whether it has been brought into compliance except as otherwise noted in this Section shall rest with the Supervising Engineer for Inspection subject to approval of the Commissioner and the Building Department.

d. Potentially deficient concrete which cannot be brought into compliance shall be evaluated by the Committee noted in Article 3.03, Paragraph B and a report submitted to the Commissioner. The Commissioner will then, in writing, either accept without qualification or accept subject to Retainage (as outlined in Article

3.03, Paragraph .C.8) or direct that the concrete be reinforced or supplemented with additional construction to bring it into compliance after which it may be resubmitted to the Commissioner.

e. Repair potentially deficient concrete work by removing and replacing or by reinforcing with additional construction as required by the Engineer. To bring the rejected work into compliance, use repair methods that will maintain the strength of the structure and meet all other applicable requirements for function, durability, dimensional tolerances, and appearance.

f. Obtain acceptance by the Engineer for repair methods and materials and for modifications needed to assure that concrete work complies with requirements in the Contract Documents.

g. The Contractor shall pay all costs incurred including redesign and reverification in bringing the concrete work into compliance and acceptance.

2. Dimensional Tolerances:

a. Formed surfaces resulting in concrete outlines smaller than required by an amount exceeding the requirements of Section 3.3 of ACI 347R shall be considered deficient in strength and subject to the provisions of Article 3.03, Paragraph C.4.

b. Formed surfaces resulting in concrete outlines larger than required, by an amount exceeding the requirements of Section 3.3 of ACI 347R may be rejected and the excess material shall be subject to removal. If removal of the excess material is permitted, it shall be accomplished in such a manner as to maintain the strength of the section and to meet all other applicable requirements of function and appearance.

c. Concrete members cast in the wrong location may be rejected if the strength, appearance or function of the structure is adversely affected or misplaced items interfere with other construction.

d. Inaccurately formed concrete surfaces exceeding the requirements of Section 3.3 ACI 347R and which are exposed to view may be rejected and shall be repaired or removed and replaced if required.

e. While the concrete is still in a workable condition, test the surface for trueness with a Contractor furnished straightedge three feet longer than one half the width of the surface. If the surface is extremely large, the straightedge shall be 16 feet long. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the entire area gone over from one side of the slab to the opposite side. Any excess water and laitance in excess of 1/8 inch shall be removed from the surface and disposed of. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished.

High areas shall be cut down and refinished. Remove all fins and other irregularities in the exposed surface of concrete by rubbing the irregularities with a carborundum brick and clean fresh water. Special attention shall be given to ensure that the surface across joints meet the smoothness/level requirements. Test the surface across the joints with a 16-foot straightedge as the joints are finished and correct any irregularities in excess of ¼ inch before the concrete has hardened. Straightedge testing and surface corrections shall continue until the entire surface is free from observable and measurable departures from the straightedge. The use of long handled wood floats shall be confined to a minimum. They may be used only in areas not accessible to finishing equipment.

3. Appearance:

   a. Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible. If, in the opinion of the Supervising Engineer for Concrete Construction, the defects cannot be repaired, the concrete shall be considered potentially deficient, such concrete shall be evaluated by the Committee noted in Article 3.03.B and a report submitted to the Commissioner. The Commissioner will then in writing, either accept without qualification or accept subject to Retainage (as outlined in Article 3.03, Paragraph C.8) or direct that other remedial measures be taken after which it may be resubmitted to the Commissioner.

4. Strength of Structure:

   a. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, including but not necessarily limited to the following conditions:

      1) Low concrete compression test strength as evaluated by Article 3.03, Paragraph B above. However, in those areas or members containing such concrete, if a structural analysis by the architect/engineer indicates the completed structure will be suitable for its intended use, i.e., that the stresses which will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual compression test strengths reported and the analysis is approved by the Building Department, the member or members will be accepted without qualification.

      2) Low concrete core tests as evaluated by Article 3.03, Paragraph B above. However, in those areas or members where core tests are made in accordance with Article 3.03, Paragraph B.4, if a structural analysis by the architect/engineer indicates the suitability of the structure for

its intended use, i.e., that the stresses which will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual core test strengths reported, and the analysis is approved by the Building Department, the areas or members will be accepted without qualification.

3) Reinforcing steel size, quantity, strength, position or arrangement at variance with the specified requirements or the Contract Drawings.

4) Concrete which differs from the required dimensions or location in such a manner as to reduce the strength.

5) Curing less than specified.

6) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7) Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

8) Poor workmanship likely to result in deficient strength.

5. Action Required When Strength Is Potentially Deficient:

a. When the strength of the structure is considered potentially deficient, the following actions may be required by the Engineer/Architect:

1) Structural analysis or additional testing or both may be required.

2) Core tests may be required.

3) If testing is inconclusive or impractical or if structural analysis does not confirm the Safety of the structure, load tests may be required and their results evaluated in accordance with ACI 318.

4) Concrete Work rejected by structural analysis or by results of a load test shall be reinforced with additional construction as required by the Engineer/Architect, or replaced.

5) Document all repair work performed to bring strength-deficient concrete work into compliance with Contract Documents, and submit the documentation to the Engineer/Architect for acceptance.

6. Durability:

a. The durability of the concrete work will be considered deficient and therefore the concrete work shall be rejected, if it fails to comply

with any of the requirements which control the durability of the structure, including, but not necessarily limited to, the following conditions:

1) Strength failing to comply with Article 3.03, Paragraph B above.

2) Materials for concrete not conforming with the specified requirements of Article 3.03, Paragraph C.2. above.

3) Concrete not conforming with either the specified air-entrainment requirements or the air content limits.

4) Curing not accomplished in accordance with Contract Documents.

5) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7. Withholding:

a. Where concrete is placed which is considered to be deficient, whether in strength, appearance, durability or any other quality defined, payment may be withheld at the discretion of the Supervising Engineer for Concrete Construction. If such concrete is subsequently accepted without qualification, then payment shall be made for such concrete including return of all monies withheld.

8. Retainage:

a. Deficient concrete which cannot be brought into compliance and is nevertheless accepted by the Commissioner shall be subject to the following permanent retainage. For every cubic yard of concrete so placed, an amount equal to 10% of the unit price for concrete in place for unit price contracts or 10% of the price established in the detailed estimate for concrete in place for lump sum contracts shall be permanently retained.

9. Rejected Concrete:

a. Concrete which has been rejected, in writing, by the Commissioner, shall be removed and replaced. The cost of all such removed and replaced concrete shall be borne by the Contractor.

10. Protection of In-Place Concrete:

a. Loading and Support of Concrete:

1) Do not allow construction loads to exceed the superimposed load which the member, with necessary supplemental support, is capable of carrying safely and without damage. Submit for acceptance data on the amount of loading,

method of distributing load, and any proposed supplemental support during construction.

b. Protection from Mechanical Injury:

1) During the curing period, protect, the Contractor shall protect the concrete and its shoring from damaging mechanical equipment inducing shock and vibrations at all times. Protect all concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions.

D. Pre-Concrete Construction Meeting: An onsite Pre-Concrete Construction Meeting will be held at the project site a minimum of one month prior to the first anticipated concrete placement including any test placements / mock-ups. Prepare and submit a Quality Control Plan a minimum of 30 days prior to the Pre-Concrete Construction Meeting or sooner as required elsewhere in this specification. Prepare for the meeting and present planned aspects of concreting work including material procurement, deliveries, mixing, transporting, placing, finishing, curing and quality control procedures. The Pre-Concrete Construction Meeting will be used to review planned concreting procedures by the Contractor and their suppliers, and testing activities planned by DEP and their testing representatives. At a minimum, the Contractor shall have the following personnel present at the meeting: Plant and Placement Supervisors, Quality Control Manager(s), Concreting Subcontractors, Testing Laboratory Manager, Finishing and Curing Supervisor(s), Admixture Suppliers, and other consultants involved with the concreting operations.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

The items below are found on the following pages:

"Table 1 -- Concrete Base Class Requirements"
"Table 2 – Concrete Mix Summary"

Sample Concrete Placement Card

Mix Design Submittal (MDS) Forms

TABLE 1 – CONCRETE BASE CLASS REQUIREMENTS

Base Class	Coarse Aggregate Sizes[2] (ASTM C 33)			Minimum Cementitious Materials[3] (lbs/cu yd)	Maximum Cementitious Materials[3] (lbs/cu yd)	Cement Type (ASTM C595/ C150)	Mineral Admixtures[1,5] (%)		Maximum Water/ Cementitious Materials Ratio[4]	Specified Strength (psi)		Estimated GWP[7] (kg CO_2e/m^3)
	A	B	C				A	B		f'c minimum field condition	f'cr minimum for mix design[6]	
45	#57 (1" to No. 4)	#8	---	564	---	IL/II	CL F (20%)	GR 100 (40%)	0.42	4,500 at 28 days	5,850 at 28 days	309
40M	#4 (1.5" to 3/4")	#57 (1" to No. 4)	#8	---	470	IL/II	CL F (30%)	---	0.45	4,000 at 90 days	4,500 at 90 days	238
40P	#67	--	--	520	---	IL/II	CL F (30%)	GR 100 (40%)	0.45	4,000 at 28 days	5,200 at 28 days	263
25	#57 to #67	---	---	376	---	IL/II	CL F (30%)	---	0.60	2,500 at 28 days	3,250 at 28 days	192

Note: Concrete containing coarse aggregate smaller than #67 shall only be used with the approval of the Engineer.

Footnotes (FN) to Table 1:

1. Mineral admixtures (pozzolans) may be substituted for cement by weight at the percentages indicated. Only one (1) pozzolan will be approved per mix. Either fly ash (A) or GGBS (B) may be used (see exceptions in note 5 below).
2. Coarse aggregate listed in column A shall be used for all concrete classes. Coarse aggregate in columns B and C may be blended with aggregate in column A to meet the combined aggregate gradation requirements.
3. Minimum cementitious materials content provided in the mix shall conform to both the requirements of the New York City Building Code's methods of proportioning and to these Specifications. Maximum cementitious materials requirements shall not be exceeded without written approval by the Engineer.
4. Total quantity of cementitious materials (cement plus mineral admixtures) shall be used to calculate the maximum water/cementitious material ratio.
5. For Classes 40M and 25 concrete, Class F fly ash shall be substituted for cement by weight at the percentage indicated. This is not an optional requirement.
6. Minimum $\mathbf{f_{cr}}$ for mix design listed in this column are based on ACI 301, Table 4.2.3.1; when data are not available to establish standard deviation.
7. Estimated GWP is based on minimum total cementitious content as listed in Table 1. Values may vary based on approved mix designs.

TABLE 2 - CONCRETE MIX SUMMARY							
Feature	**Compressive Strength (f'_c) (psi)**	**Base Class**	**Underwater Placement[1]**	**Colored Concrete**	**Crystalline Waterproofing**	**Concrete Mix ID**	**Surface Coating, if Applicable**
Spillway Crest & Downstream Steps	4,000	40M	No	**Yes**	No	40MC	n/a
Spillway Crest Vanes	4,500	45	No	**Yes**	No	45C	n/a
HLRT Tremie Concrete Pad	2,500	25	**Yes**	No	No	25U	n/a
HLRT Foundation Base Slab	4,500	45	**Yes**	No	**Yes**	45UW	Grout Pad
HLRT Wedge Wall – below pool	4,500	45	**Yes**	No	No	45U	n/a
HLRT Wedge Wall – above pool	4,500	45	No	No	No	45	n/a
HLRT Walls (below El. 1138.5)	4,500	45	No	**Yes**	**Yes**	45CW	n/a
HLRT Operating Floor Slab	4,500	45	No	**Yes**	No	45C	n/a
HLRT Superstructure Walls	4,500	45	No	**Yes**	No	45C	Painted Interior
HLRT Roof Slab	4,500	45	No	**Yes**	No	45C	Painted Interior
HLRT Parapet & Hatch Curbs	4,500	45	No	**Yes**	No	45C	n/a
UGC/HLRT doorway	4,500	45	No	No	No	45	Painted Interior
UGC Floor Slab Restoration	4,500	45	No	No	No	45	n/a
UGC Roof Hatch Closure	4,500	45	No	No	No	45	n/a

TABLE 2 - CONCRETE MIX SUMMARY							
Feature	**Compressive Strength (f'_c) (psi)**	**Base Class**	**Underwater Placement[1]**	**Colored Concrete**	**Crystalline Waterproofing**	**Concrete Mix ID**	**Surface Coating, if Applicable**
M18 Access Stairway Modifications	4,500	45	No	**Yes**	No	45C	n/a
HLO Access Stairway (along West Training Wall)	4,500	45	No	**Yes**	No	45C	n/a
Outfall Structure Walls & Cover Slab	4,500	45	No	**Yes**	No	45C	n/a
HLO Tunnel in Spillway (Pumped Concrete Fill)	4,000	40P	No	No	No	40P	n/a
HLO Pipe Cradles	4,500	45	No	No	No	45	n/a
Other, Non-Specified	4,500	45	No	No	No	45	n/a

Notes:

1. Concrete Class ID Designations: M - Mass Concrete; P – Pumpable Concrete Fill; U - Underwater Placement; C - Colored Concrete; W - Crystalline Waterproofing; n/a - Not Applicable.
2. All concrete placed underwater shall contain an approved antiwashout admixture or consist of an approved pre-manufactured tremie concrete mix, as specified in this Section.

SAMPLE CONCRETE PLACEMENT CARD

Contract:	**Contractor:**		
Placement Date:		**Concrete Mix:**	
Scheduled Start Time:		**Approximate Quantity:**	**cu. yds.**
Identification of Placement: **Placement No:**			
Item	**Initials** **Inspector**	**Date**	**Remarks**
Foundations			
Construction Joint Preparation			
Forms and Blockouts			
Waterstops			
Reinforcement			
Embedments/Anchor Bolts			
Piping/Test			
Temperature Checkout			
Cleanup			
Provisions for Weather			
Contractor			
Electrical Contractor			
HVAC Contractor			
Plumbing Contractor			
Structures Contractor			

Mix Design
Proportions Summary Sheet
MDS

- USE ONE FORM PER MIX DESIGN -

Contract:	Mix Design Code (DEP Only):	Class (Specified Strength): PSI + %	Proposed Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:		Testing Laboratory:	
Mix Description (Common Name)	Concrete Supplier Address:		Testing Laboratory Address:	
	City: / State: / Postal Code:		City: / State: / Postal Code:	

Expedite:	Application:	Field Inspection:	Weight Type:	Fly Ash:	Field Curing:
☐ Yes (Comment Reqd.) ☐ No	☐ Structural ☐ Non-structural	☐ Yes (Controlled) ☐ No (Uncontrolled)	☐ Normal ☐ Lightweight	☐ Yes, List %: ☐ No	☐ Yes, Min. Days: ☐ No

Specimen Transport, Testing & Disposal Ages (Use Comments Area, If Applicable):	No. of Specimens (Per Set)	Transport Age (Days)	Test Age (No. of Specimens at Days)						Disposal Age for Unused Specimens (Days)
			Preliminary		Final		Other(s)		
			Qty	Days	Qty	Days	Qty	Days	
☐ Yes ☐ No CQAP Standard	5	2	2	7	3	28	-	-	28
☐ Yes ☐ No Other:									

Cement /Slag /Fly Ash

Grade/Class:	Source:	PCY:

Cement/Slag /Fly Ash

Grade/Class:	Source:	PCY:

Crushed Stone

Size Number:	Source:	PCY (SSD):

Crushed Stone

Size Number:	Source:	PCY (SSD):

Sand

Type:	Source:	FM:	PCY (SSD):

Water

	PCY:	GAL/CY:

Air Entraining Admixture

Designation:	Brand:	OZ/CY:

_____-Range Water Reducing Agent

Designation:	Brand:	OZ/CY:

Water-Reducing/Retarding Agent

Designation:	Brand:	OZ/CY:

Other Admixtures

Designation:	Brand:	OZ/CY:
Designation:	Brand:	OZ/CY:
Designation:	Brand:	OZ/CY:

Specified Slump (IN):	Specified Air Content (%):	Yield (CY):	Theoretical Unit Weight (PCF):	Water-Cement Ratio (from trial batch):

Comments:

- SUBMIT TO NYCDEP CQAP AT 1-800-673-2816 -

Submitted By (Print): **Testing Laboratory:** **Signature:** **Date:**

Mix Design
Submittal of Proportions
MDS

Contract:	Mix Design Code (DEP Only):	Class (Specified Strength): PSI + %	Proposed Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:		Testing Laboratory:	

Cement (ASTM C150)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Other Cementitious Materials (ASTM C18)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Aggregate No. 1, Fine (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	FM:

Aggregate No. 2, Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 3, 4 Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 2, Lightweight Alternative (ASTM C330)

Type:	Sp. Gr. Factor:	Size:	Source:	Oven Dry (PCY):	Volume (CU FT):

Loose Unit WT (PCF):	Estimated Wet (PCF):	

Chemical Admixtures (OZ/CY)

No. 1 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 2 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 3 ASTM C:	Type:	Source:	Name:	WT (OZ):

Water (Total)			**Air Content**		**Total Mixture Mass and Volume**	
GAL:	PCY:	CU FT:	%	CU FT:	LB/CU FT:	CU FT:

Comments:

Submitted By (Print):	**Company:**	**Signature:**	**Date:**

Mix Design
Aggregates Gradation
MDS

Sieve Size	Percent Passing Aggregate No.								
	1 (Fine)		2 (Coarse) Stone Size (no):_____		3 (Coarse) Stone Size (no):_____		4 (Coarse) Stone Size (no):_____		Combined Gradation
	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	
3 IN									
2 1/2 IN									
2 IN									
1 1/2 IN									
1 IN	-								
3/4 IN	-								
1/2 IN	-								
3/8 IN	100								
1/4 IN	-								
#4	95-100								
#8	80-100								
#16	50-85								
#30	25-60								
#50	5-30								
#100	0-10								
Dry Unit WT (PCF)									
Absorption (%)									
FM									

Remarks:

Mix Design
Trial Batches Proportions
MDS

Material (Trial Batch Proportions Per Cubic Yard)			Trial Batch No. #1	#2	#3	#4
1. Cement						
Type:	Source:		LB:	LB:	LB:	LB:
2. Other Cementitious Material						
Type:	Source:		LB:	LB:	LB:	LB:
Grade/Class:						
3. Aggregate No. 1 (Fine) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	FM:	Absorption (%):				
4. Aggregate No. 2 (Coarse) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):				
5. Aggregate No. 3 & 4 (Coarse) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):				
6. Aggregate No. 2 (Lightweight, Alternative)						
Type:	Source:		Oven Dry: LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):	Wet: LB:	LB:	LB:	LB:
7. Water (Total):			LB:	LB:	LB:	LB:
8. Water-Cementitious Ratio:						
9. Chemical Admixtures						
No. 1 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 2 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 3 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
10. Total Mass			LB:	LB:	LB:	LB:
11. Total Mass Per Cubic Foot (Theoretical Unit Weight)			PCF:	PCF:	PCF:	PCF:

Mix Design
Mixture Properties
MDS

Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
1. Fresh Concrete						
Temperature (F):	C1064					
Slump (IN):	C143					
Before Add HRWR						
End of Mixing						
15 (MIN)						
30 (MIN)						
45 (MIN)						
1 (HR)						
Unit WT (PCF):	C138					
Air Content (%):	C231/C173					
Mortar Content (%):						
Yield (CU FT/CU YD):						
Water-Cementitious Ratio						
Time of Set (MIN):	C403					
Initial (MIN):						
Final (MIN):						
Difference (MIN):						
2. Hardened Concrete						
Cylinder No.			1 (A-_____)	2 (A-_____)	3 (A-_____)	4 (A-_____)
Compressive Strength (PSI):	C39/C192					
3 Days						
Specimen 1						
Specimen 2						
Average						
7 Days						
Specimen 1						
Specimen 2						
Average						
28 Days						
Specimen 1						
Specimen 2						
Specimen 3						
Average						

Mix Design
Mixture Properties
MDS

Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
56 Days (If Required by Contract Only)						
Specimen 1						
Specimen 2						
Average						
Shrinkage (%):	C157					
_____ Days						
Specimen 1						
Specimen 2						
Average						
_____ Days						
Specimen 1						
Specimen 2						
Average						
Observations						
Color						
Bleeding						
Heat Signature (If Specified in the Specification and for the Submitted Batch Only)						

Trial Batch No. **(Submitted and Recommended for Approval):**

Comments:

Laboratory Director (Print):	**Company:**	**Signature & Seal:**	**Date:**
CQAP WITNESS (Print):	**Company:**	**Signature:**	**Date:**
Contractor (Print):	**Company:**	**Signature:**	**Date:**
Designer Of Record (Print):	**Company:**	**Signature:**	**Date:**

Mix Design
Laboratory Trial Batch Mix Design Data
MDS

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Basic Description of Specified Mix Design (Mix Design Common Name):	Trial Batch Date:
Batch Plant Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Weight Type: ☐ Normal ☐ Lightweight
			Concrete Type: ☐ Pump ☐ Conventional

Description				Weight Per Cubic Yard			
Mix Point No.:				1	2	3	4
Cement:			LBS				
Cementitious:			LBS				
Sand:			LBS				
Stone:			LBS				
Stone:			LBS				
Water:			GAL				
Water:			LBS				
Admixture:		Air	OZ				
Admixture:		HRWR/MRWR	OZ				
Unit Weight:			PCF				

Description				Laboratory Trial Batch Weights			
Mix Point No.:				1	2	3	4
Cement:			LBS				
Cementitious:							
Sand:			LBS				
Stone:			LBS				
Stone:			LBS				
Water:			LBS				
Admixture:		Air	ML				
Admixture:		HRWR/MRWR	ML				

Description			Trial Batch Results							
Mix Point No.:			1		2		3		4	
Time:			Initial	30 MIN	Initial	30 MIN	Initial	30 MIN	Initial	30 MIN
Slump:		IN								
Water Content:		LBS								
Water Used:		LBS								
Computed Mix Water:		LBS								
Total Mix Water:		LBS								
Unit Weight:		LBS								
		PCF								
Air:		%								
Temp:		DEG								
Actual W/C Ratio										

Comments:

CQAP WITNESS (Print): **Company:** **Signature:** **Date:**

Mix Design
Trial Batch Strength Test Results Form
ASTM C39/ C192

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Trial Batch Date:

Preliminary Strength Testing (See Page 1 for Preliminary Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

Final Strength Testing (See Page 1 for Final Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

CQAP CPM Comments (Preliminary & Final Age Testing):

CQAP CPM (Print): Company: Signature: Date:

Mix Design
Trial Batch Strength Test Results Form
ASTM C39/ C192

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Trial Batch Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

CQAP CPM Comments (Preliminary & Final Age Testing):

CQAP CPM (Print): Company: Signature: Date:

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 03 32 00 - JOINTS IN CONCRETE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of providing all labor, materials, and incidentals necessary to furnish and install joints, joint materials, waterstops and embedded items as indicated on the Contract Drawings, specified herein and as needed for a complete installation.

B. Joints shall comply with the requirements of Section 03 10 00 - Concrete Forming and Accessories.

C. Types of joints in concrete shall be as follows:

1. Construction Joints - Joints between adjacent concrete placements continuously connected with reinforcement.

2. Control Joints - Joints formed in concrete to provide a weakened plane in the concrete section to control formation of shrinkage cracks.

3. Expansion Joints - Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.

4. Contraction Joint - Joint in concrete between two concrete pours. Main reinforcement is discontinuous at this joint.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Implementation	11
3.03	Field Testing / Quality Control	16
3.04	Startup / Demonstration	16

3.05 Adjusting / Protection / Cleanup.....16

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming and Accessories

B. Section 03 30 00 - Cast-in-Place Concrete.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ASTM C 920 - Elastomeric Joint Sealants

2. ASTM C 990 - Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

3. ASTM C 1016 - Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material.

4. ASTM D 545 - Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types).

5. ASTM D 994 - Preformed Expansion Joint Fillers for Concrete (Bituminous Type).

6. ASTM D 1190 - Concrete Joint Sealer, Hot-Applied Elastic Type.

7. ASTM D 1191 - Test Methods for Concrete Joint Sealers.

8. ASTM D 1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

9. ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

10. ASTM D 2835 - Lubricant for Installation of Preformed Compression Seals in Concrete Pavements.

11. ASTM D 5329 - Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
12. ASTM D 5973 - Elastomeric Strip Seals with Steel Locking Edge Rails Used in Expansion Joint Sealing.
13. ASTM D 5898 - Guide for Standard Details for Adhered Sheet Waterproofing.
14. ASTM E 1612 - Preformed Architectural Compression Seals for Buildings and Parking Structures.
15. ASTM E 1783 - Preformed Architectural Strip Seals for Buildings and Parking Structures.
16. ASTM F 1123 - Non-Metallic Expansion Joints.
17. ACI 318 - Building Code Requirements for Structural Concrete.
18. ISO 14025 - Environmental labels and declarations - Type III environmental declarations
19. New York State Building Code (NYSBC).
20. NYC Department of Transportation, Standard Highway Specifications.
21. U.S. Army Corps of Engineers Specifications for Polyvinyl Chloride Waterstops, CRD-C572.

1.05 DESCRIPTION

A. The Contractor shall install joint material per the construction schedule submitted to and approved by the Engineer in a sequence and manner that will not damage the Work.

1.06 QUALITY ASSURANCE

A. Reviews of Shop Drawings shall be obtained before custom fabrication is started and before delivery of materials to the project site.

B. Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

C. Joint installation procedures and health and safety of the work force shall be the responsibility of the Contractor. The requirements of authorities having jurisdiction shall be complied with.

D. The final responsibility for constructing a watertight condition at expansion joints, contraction joints, and construction joints remains with the Contractor as part of the Work under this Contract. Errors of detailing and fabrication and for the correct fit of the work shall be the responsibility of the Contractor.

E. Defective Work, as determined by the Engineer, shall be remedied by cutting and rebuilding the concrete walls and slabs, replacing the waterstop assemblies or other methods as approved by the Engineer.

1.07 SUBMITTALS

A. Contractor shall submit Shop drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Information as shown on the Contract Drawings and at the site, where necessary.

2. Sizes, sections, reinforcement and dimension of units, the jointing, dowels, anchors, etc., and all other necessary details.

3. Installation of joints, including various connections, anchorage details, special jointing, the Contractor's proposed construction and control joints, and other accessories as required to complete the work.

4. Prior to installation, the Contractor shall submit layout drawings for approval, showing the extent of the waterstop installations that are proposed to ensure that all construction, contraction, and expansion joints, in water-containing structures, will be watertight. The drawings shall include elevations, sections, etc., and all details to show that a continuous watertight installation is provided.

5. Equipment pad layout drawings.

B. Manufacturer's specifications and installation instructions for each type of required joint and accessory shall be submitted. These include expansion joint fillers, expansion joint sealers, waterstops, shapes of waterstops, chemical retarders, adhesives, sleeves, inserts, anchors, embedded items, and similar items.

C. The Contractor shall submit to the Engineer one sample of each type of waterstop. Each sample shall include a splice.

D. Method to be used to roughen construction joints and achieve bond including product identification as applicable.

E. Applicator's Qualifications.

F. Proof of satisfactory field service of sealants.

G. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials

Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition and at such intervals as will avoid delay in the Work.

B. Materials shall be stored and protected in a clean, properly drained location and shall be kept off the ground under a weather-tight covering permitting good air circulation. Materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure. The maximum uniform distributed storage load shall not exceed 20 pounds per square foot.

C. Materials shall be protected before, during and after installation to ensure acceptable finished Work. In-place materials and other Work in connection with the joint installations shall be protected.

D. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and installing.

E. In the event of damage to the Work, necessary repairs or replacements shall be performed until satisfactory work is met at no expense to DEP.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Concrete Bonding Agent

1. The concrete bonding agent shall be:

a. Corr-Bond, as manufactured by Euclid Chemical, East Brunswick, NJ.

b. Armatec 110, as manufactured by Sika Chemical Company, Lyndhurst, NJ

c. Or approved equal

B. Expansion joint fillers (Type I) shall be:

1. Type FF-7 cross-linked, closed cell polyethylene, as manufactured by Progress Unlimited Inc., Lynbrook, NY.

2. Type W, cross-linked, closed cell polyethylene, as manufactured by Hydrozo/Jeene, Inc, Lincoln, NE.

3. Or approved equal

C. Joint Sealants:

1. Type A shall be

a. Sikaflex-2C NS/SL as manufactured by Sika Corporation, Lyndhurst, NY.

b. Sonolastic SL-1, as manufactured by Sonneborn/Master Business Solution, Parsippany, NJ.,

c. Permapol RC-270 Reservoir Sealant, as manufactured by Products Research and Chemical Company, (now is Courtaulds, PLC,) London W1A2BB, England.

d. Or approved equal.

2. Type B shall be

a. Magnum NS-100, as manufactured by Tamms Industries, Kirkland, IL.

b. Sikaflex 1A, Sika Corporation, Lyndhurst, NY.

c. Or approved equal.

3. Type C shall be

a. Sonolastic Two-part, as manufactured by Sonneborn/Master Business Solution, Parsippany, NJ.

b. Hornflex-L, as manufactured by Tamms Industries, Kirkland, IL.

c. Cormax PSC, as manufactured by DuPont, (Multiple locations in USA).

d. Or approved equal.

D. PVC waterstops shall be:

1. Model 679 for construction joints, Model 738 for expansion and contraction joints, Model 609 for 3-inch retrofit system (at HLRT), and Model 667 for

6-inch retrofit system (at Spillway), as manufactured by Greenstreak/Sika Corp USA, Lyndhurst, NJ.

2. Or approved equal.

E. Hydrophilic Rubber Waterstops shall be:

1. Duroseal Gasket, Type 2010, as manufactured by BBZ USA, Inc, St. Louis, MO

2. Adeka Ultraseal MC-2010M, as manufactured by Asahi Denka Kogyo KK, Japan

3. Or approved equal.

F. Hydrophilic Sealant shall be:

1. Leakmaster LV-1 as manufactured by Greenstreak, St. Louis, MO.

2. Duroseal Paste, by BBZ USA, Inc, St. Louis, MO.

3. Adeka Ultraseal P-201, by Asahi Denka Kogyo K.K, Japan.

4. Sika Swell S, by Sika Corporation, Lyndhurst, NJ.

5. Or approved equal.

G. Hydrophilic Injection Resin shall be:

1. Duroseal Inject 1K/2K, by BBZ, USA, Inc., St. Louis, MO.

2. Sika Injection 29 by Sika Corporation, Lyndhurst, NJ.

3. Or approved equal.

H. Injection Hose Waterstops shall be:

1. Fuko Injection System, as manufactured by BBZ USA Inc., St. Louis, MO.

2. Sika Swell Hose as manufactured by Sika Corporation, Lyndhurst, NJ.

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

1. Concrete Bonding Agent

a. The concrete bonding agent product and manufacturer shall be as specified in this Section.

b. Surface preparation, application and curing shall be performed in strict accordance with the manufacturer’s directions.

B. Performed Expansion Joint Filler

1. Preformed expansion joint filler shall be nonextruding, and shall be of the following types:

a. Type I Sponge Rubber, conforming to ASTM D 1752, Type I.

b. Type II Cork, Conforming to ASTM Designation D 1752, Type II.

c. Type III Self-expanding cork, conforming to ASTM Designation D 1752, Type III.

d. Type IV Bituminous Fiber, conforming to ASTM Designation D 1751.

2. Expansion joint fillers (Type I) product and manufacturer shall be as specified in this Section.

3. Unless otherwise specified, Type II and Type III shall conform to the requirements of the Standard Highway Specifications of the NYC Department of Transportation.

4. Asphaltic blown joint filler for sealing joints over Type IV preformed joint filler shall comply with the requirements of Section 2.16 of the Standard Highway Specifications of the NYC Department of Transportation.

C. Joint Sealants

1. Type A: Multi-component, non-sag, low-modulus polyurethane rubber sealant meeting ASTM C 920, Type M, Grade NS, Class 25, use NT, M, A, and O, capable of withstanding 50% in extension or compression shall be as specified in this Section.

2. Type B: Single component polyurethane sealant meeting ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, and O, capable of withstanding 25% in extension or compression shall be as specified in this Section.

3. Type C: Multi-component chemical resistant polysulfide sealant conforming to ASTM C 920, Type M, Grade NS, Class 25 shall be as specified in this Section.

D. Backer Rod

1. Backer rod shall be an extruded closed-cell polyethylene foam rod. The material shall be compatible with the sealant material used and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at 8 psi. The rod shall be 1/8-inch larger in diameter than the joint width at joints less than 3/4-inch wide and 1/4-inch larger in diameter at joints 3/4-inch end wider.

E. PVC Waterstops

1. PVC waterstops shall be manufactured from virgin polyvinylchloride and shall meet or exceed all requirements set forth in the U.S. Army Corps of Engineers Specification CRD C 572.

2. All PVC waterstops shall be of polyvinylchloride extruded from an elastomeric plastic compound of which the basis resin shall be polyvinylchloride. The compound shall contain any additional resins,

plasticizers, stabilizers or other materials needed to ensure qualities which will meet the requirements herein specified.

3. The required minimum physical characteristics for this material are:

   a. Tensile strength 1,750 psi

   b. Ultimate elongation not less than 280%.

4. No reclaimed PVC materials shall be used for manufacture of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.

5. PVC waterstops for construction joints shall be flat ribbed type, 6 inches wide unless otherwise shown on the Contract Drawings, with a minimum thickness at any point of 3/8 inches.

6. PVC waterstops for expansion and contraction joints shall be ribbed with a center bulb, 9 inches wide with a minimum thickness at any point of 3/8 inches. The center bulb shall have an O.D. not less than 1-3/8 inches.

7. All PVC waterstops for expansion and contraction joints shall have an integral fastening system consisting of hog rings and grommets. Retrofit waterstops shall be provided with stainless steel batten bars, anchor bolts and underlayment per manufacturer's recommendations where shown on the Contract Drawings.

8. PVC waterstops product and manufacturer shall be as specified in this Section.

F. Hydrophilic Rubber Waterstop

1. Hydrophilic rubber waterstop materials shall be bentonite-free and shall expand by a minimum of 80 percent of dry volume in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast. For location, see the Contract Drawings.

2. The material shall be composed of resins and polymers which absorb water and cause an increase in volume in a completely reversible and repeatable process. The waterstop material shall be dimensionally stable after repeated wet-dry cycles with no deterioration of swelling potential.

3. Hydrophilic rubber waterstop shall be solid rectangular shape with minimum cross sectional dimensions of 3/8-inch by 3/4-inch.

4. Hydrophilic Rubber Waterstops product and manufacturer shall be as specified in this Section.

G. Hydrophilic Sealant

1. The Hydrophilic Sealants shall adhere firmly to concrete, metal and PVC in dry or damp conditions. When cured, it shall be elastic indefinitely.

2. Hydrophilic Sealants product and manufacturer shall be as specified in this Section.

H. Hydrophilic Injection Resin

1. Hydrophilic injection resin shall be acrylate-ester based. Its viscosity shall be less than 50 cps. It shall be water soluble in its uncured state, solvent free, and non-water reactive. In the cured state, it shall form a solid hydrophilic flexible material which is resistant to permanent water pressure and shall not attack bitumen, joint sealants or concrete.

2. Hydrophilic Injection Resin product and manufacturer shall be as specified in this Section.

I. Injection Hose Water Stop

1. Injection hose shall consist of a PVC or neoprene central core of sufficient strength to resist the weight of a minimum of 25 feet of fresh concrete placed upon it. Injection openings shall be provided closely spaced along the length of the hose and in a minimum of three (3) locations equally spaced around the perimeter of the hose. The openings shall be sealed by strips of closed cell foam of a consistency to act as one-way valves preventing entrance of cement paste while allowing free flow of injection material, pumped through the hose, into the concrete joint surface.

2. Injection hose system shall be appropriate for the injection of hydrophilic injection resin. The hose shall allow for vacuuming operations and repeated use. The construction of the hose shall permit free discharge of the specified injected grout into the concrete without backwash, for the entire length of the hose.

3. Injection hose system shall be complete with hold-down clips, connection tubes, fittings and injection connections designed to be mounted flush with the concrete surface and sealed to allow for future injections. All components of the system shall be provided by the same manufacturer.

4. Injection Hose Waterstops product and manufacturer shall be as specified in this Section.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the work shall be field verified.

Variances and discrepancies from the Contract Drawings and potential interferences shall be reported promptly to the Engineer.

2. Sufficient field measurements shall be taken prior to preparation of Shop Drawings and fabrication of construction materials, where possible, to ensure proper fitting of the work. However, job progress shall not be delayed. Allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the work.

3. Actual field-verified conditions may require modifications to the fabrication and/or erection details indicated on the Contract Drawings. The Work shall be performed to meet actual field conditions encountered.

B. Preparation

1. The Contractor shall examine the areas and conditions under which the Work of this Section is to be performed. Conditions detrimental to the proper and timely completion of the Work shall be corrected. Work shall not be proceeded until unsatisfactory conditions have been corrected.

2. All new placement of concrete shall be in accordance with Section 03 30 00 – Cast-In-Place Concrete.

3. Concrete shall not be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

4. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.

5. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

6. All joints shall be sealed as shown on the Contract Drawings.

C. Not Used

3.02 IMPLEMENTATION

A. Construction Joints

1. Construction joints shall be as shown on the Contract Drawings where structural integrity is affected, otherwise, Contractor shall submit description of the joint and its location to the Engineer for approval.

2. Unless noted otherwise on the Contract Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on the

Contract Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

3. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0" unless otherwise indicated on the Contract Drawings.

4. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.

5. Except as identified below, waterstop shall be provided at all joints in water retaining structures. Waterstop shall be provided at all joints below grade in walls or slabs which enclose an accessible area.

    a. Waterstop shall not be required at construction joints within the mass concrete placement for the spillway monoliths.

    b. Retrofit waterstop shall be provided along the spillway crest overlay and at the walls of the HLRT as indicated on the Contract Drawings.

    c. Waterstop shall not be required where the HLO access stairway abuts the spillway west training wall.

6. All reinforcing steel and welded wire fabric shall be continued across joints. Inclined dowels shall be provided as detailed or directed by the Engineer.

7. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed. Following methods are acceptable:

    a. The use of an approved chemical retarder applied in accordance with the manufacturer’s recommendations which delays but does not prevent the setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.

    b. By roughening the surface of the concrete in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface.

8. All construction joints shall be bonded by an approved adhesive applied in accordance with the manufacturer’s recommendations.

B. Control Joints

1. Location of control joints shall be as shown on the Contract Drawings.

2. Control joints shall be formed with control joint inserts.

3. Sawcutting of control joints in lieu of forming shall not be allowed unless otherwise noted on the Contract Drawings. Where sawcutting is allowed, joints shall be sawed as soon as the concrete can support foot traffic without

leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.

4. Unless noted otherwise on the Contract Drawings, depth of control joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

C. Expansion and Contraction Joints

1. Size and location of expansion and contraction joints shall be as shown on the Contract Drawings.

2. A center-bulb type waterstop shall be provided at all expansion and contraction joints in water-retaining structures. A center-bulb type waterstop shall be provided at all expansion and contraction joints below grade in walls or slabs which enclose an accessible area. Waterstop shall be as shown on the Contract Drawings and specified herein.

3. Waterstop shall be required at each transverse contraction joint separating the spillway monoliths only to the extent shown on the Contract Drawings.

4. Waterstop shall not be required where the spillway concrete and access stairs abuts the west training wall.

5. Expansion joint filler for use in concrete pavements and structures shall be Types I, II, or III. Expansion joint filler-for use in sidewalk and curbing shall be Type IV.

6. Reinforcement or other embedded items bonded to the concrete (except dowels in floors bonded on only one side of joint) shall not be permitted to extend continuously through any expansion or contraction joint.

D. Installation of Joints and Joint Filter

1. Type B joint sealant shall be used in all expansion and control joints in concrete except Type A joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and Type C joint sealant shall be used in high corrosive areas unless otherwise specified or shown on the Contract Drawings.

2. Joint fillers and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Contract Drawings. Prior to sealant installation, the Contractor shall arrange to have a representative of the sealant manufacturer instruct the crew doing the work as to the proper methods of surface preparation, mixing and application of the sealant. The joint filler shall be furnished with a pressure sensitive adhesive or a separate adhesive as recommended by the manufacturer.

3. Joint filler that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The filler shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

4. A bond breaker of polyethylene film shall be used between filler and sealant. The joint shall be thoroughly clean and free from dirt and debris and shall receive a light sand blasting before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration.

5. The primer and sealant used shall be supplied by the same manufacturer. Sealant shall not be placed without the use of a primer.

6. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

7. The depth of the sealant shall not exceed the width of the joint.

8. All sealants used in water retaining structures shall achieve final cure at least seven (7) days before the structure is filled with water.

E. PVC Waterstops

1. The design and location of PVC waterstops in construction joints, contraction joints, and expansion joints shall be as specified herein and shown on the Contract Drawings. Splices in PVC waterstops shall be made, and molded pieces used, as recommended by the manufacturer.

2. Each piece of premolded PVC waterstop shall be of maximum practicable length in order that the number of end joints will be held to a minimum.

3. Joints shall develop effective watertightness fully equal to that of the continuous PVC waterstop material and shall permanently develop not less than 80 percent of the mechanical strength of the parent section and shall permanently retain its flexibility.

4. PVC waterstops shall be installed in the Work so that they are embedded to an equal depth in concrete on both sides of the joint in keyways as shown on the Contract Drawings and shall be kept free from oil, grease, mortar or other foreign matter. PVC waterstops shall be adequately secured against movement during the pouring of concrete. Contractor shall submit methods of PVC waterstop installation to the Engineer for approval prior to placing the concrete. Concrete adjacent to PVC waterstops shall be placed in 12 inch lifts and power vibrated to prevent honeycombing, voids and separation of aggregates at the surfaces of concrete separation joints.

   a. PVC waterstop fabrications for all changes of direction, intersections and transitions shall be made in the shop, leaving only straight butt joint splices for the field.

   b. Butt joint splices of PVC waterstop runs shall be made by heat sealing the adjacent surfaces in accordance with the manufacturer's recommendations using a thermostatically controlled electric source of heat. At least three satisfactory field splices shall be made as samples on site. The Engineer may require tests on these splices by an approved laboratory, at the Contractor's expense, to certify the

tensile strength of the joint. The strength attained shall be at least 80% of the unspliced material before any is used in the work.

F. Hydrophilic Waterstop

1. Hydrophilic rubber waterstop or sealant shall be installed in accordance with the manufacturer's instructions and recommendations, except as modified herein.

2. The manufacturer shall provide technical assistance in the field.

3. The waterstop or sealant shall be located as near as possible to the center of the joint and shall be continuous around the entire joint. The minimum distance from the edge of the waterstop to the face of the member shall be 3 inches.

4. Where a hydrophilic rubber waterstop is used in combination with PVC waterstop, the hydrophilic rubber waterstop shall overlap the PVC waterstop for a minimum of 6 inches. The contact surface between the hydrophilic rubber waterstop, and the PVC waterstop shall be filled with hydrophilic sealant.

5. The hydrophilic rubber waterstop shall be installed in a bed of hydrophilic sealant, before skinning and curing begins, so that any irregularities in the concrete surface are completely filled and the waterstop is bonded to the sealant. After the sealant has cured, concrete nails, with washers of a diameter equal to the waterstop width shall be placed to secure the waterstop to the concrete at a maximum spacing of 18 inches.

6. Prior to installation of hydrophilic sealant, the concrete surface shall be wire brushed or sand blasted to remove any laitance or other materials that may interfere with the bonding. Surfaces of metal or PVC to receive sealant shall be cleaned of paint and any material that may interfere with bond. When sealant alone is shown on the Contract Documents, it shall be placed in a built-up bead which has a triangle cross section with each side of the triangle at least 3/4 inch in length, unless indicated otherwise. Concrete shall not be placed until the sealant has cured in accordance with the manufacturer's recommendations.

G. Injection Hose Waterstop

1. The injection hose shall be installed in maximum lengths of 40 feet and shall be located as shown on the Contract Drawings. The hose shall be clamped into position with anchor clips spaced approximately 6 to 10 inches apart.

2. The concrete surface shall be cleaned of stones and debris prior to installation of injection hose. The injection hose shall be installed in direct contact with the face of concrete at the construction joint to prevent floating of the hose in the freshly placed concrete.

3. Where injection hose is used in combination with PVC waterstop, the hose shall overlap the PVC waterstop for a minimum of 6 inches and shall be less than 2 inches away from the PVC.

4. The injection procedure shall be performed in strict conformance with the manufacturer's recommendations. The injection shall be made by an authorized applicator as recommended by the injection system supplier.

5. The injection system supplier or his approved representative shall provide the necessary supervision to satisfy the Engineer that the application conforms strictly to the manufacturer's recommendations.

6. The injector hose and opposite hose vent for each hose length shall be terminated in the injection boxes mounted on the dry side of the wall. At the end of the injection operation, the hose shall be cleaned in accordance with the procedure recommended by the manufacturer. The injection ends and the vents shall be plugged and the box covered leaving the system ready for reinjection in the event that the joint is leaking.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. PROTECTION

1. Joints and accessories shall be protected from damaging from traffic during the entire construction period. Waterstops provided for adjoining future structures shall be protected from corrosion as shown on the Contract Drawings.

END OF SECTION

SECTION 03 35 00 - CONCRETE FINISHING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all materials, labor, and equipment required to provide finishes of all concrete surfaces specified herein and shown on the Drawings.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Implementation	8
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	13
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming and Accessories

B. Section 03 30 00 - Cast-in-Place Concrete

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards:

1. New York State Building Code (NYSBC)
2. ACI 301 - Specifications for Structural Concrete for Buildings
3. ACI 302.1R - Guide for Concrete Floor & Slab Construction
4. ACI 303R - Guide to Cast-in-Place Architectural Concrete Practice
5. ACI 308.1 - Specification for Curing Concrete
6. ACI 318 - Building Code Requirements for Structural Concrete
7. ACI 303R - Guide to Cast-in-Place Architectural Concrete Practice
8. ACI 347R - Guide to Formwork for Concrete
9. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Finish the mock-up for the cast-in-place spillway facing specified in Section 03 10 00 – Concrete Forming and Accessories and Section 03 30 00 – Cast-In-Place Concrete and as follows:

1. Apply to the mock-up surface various specified finish techniques as directed by the Engineer. The Engineer, the finish material representative, and the concrete consultant shall be present during finishing tests.
2. The Mock-up finishes shall be approved prior to performing finish work on the spillway facing.
3. No water repellent sealer shall be used on the mock-up or the completed spillway facing.
4. Leave the approved mock-up on the job during construction as the standard of workmanship for the project. Remove mock-up form the premises after completion of the work.

B. Perform work in accordance with ACI 301, ACI 302.1R, ACI 308.1, ACI 318 and ACI 347R and other applicable codes.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Material certifications and technical data sheets.

2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of material used in the Work.

B. Manufacturer’s data for formwork for exposed-to-view surfaces shall show type of back-up support system, form facing material, form ties, crack control devices, form caulking, form joint gasket material, form joint caulking sealant materials, reveal/rustication form strips, form liners, dovetail anchor slots, release agent, form coating material and all other materials for execution of the formwork to meet the specification requirements.

C. Submit Product Data for the following:

1. Cleaning solutions – each type

2. Water repellent sealer

D. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor’s approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor’s New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General: Failure to comply with the following shall be sufficient cause for rejection of materials by the Engineer and his requiring its removal from the Site. Upon determination by the Engineer that the material is subject to rejection, the Contractor shall supply new material at no additional expense to DEP.

B. Delivery of Materials:

1. Deliver materials in manufacturer's original unopened and undamaged containers, with all labels intact and legible at the time of use.

2. The label shall include:

a. Name of material and manufacturer.

b. Installation, handling and protection requirements.

c. Safety Data Sheet as required.

3. Deliver materials in sufficient quantities to allow uninterrupted continuity of the work, minimizing the amount of time stored prior to being used on the Site.

C. Storage of Materials:

1. Store only approved materials on project site.

2. Store materials in original, undamaged containers with manufacturer's labels and seals intact.

3. Store all materials in secure, enclosed, dry area, off the ground and away from all possible contact with water and in a location where temperature can be maintained above freezing. Protect stored materials as per manufacturer’s instructions.

4. Prevent damage to materials during storage primarily by minimizing the amount of time they are stored at the Site before being incorporated into construction systems.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Concrete Floor Sealer

1. Floor sealer shall be:

a. MasterTop TC 493 330 as manufactured by Master Builders Solutions by BASF, Florham Park, NJ;

b. Superior Diamond Clear VOX as manufactured by Euclid Chemical, Cleveland, OH;

c. ArmorSeal Rexthane I as manufactured by Sherwin Williams,

d. Masterseal 330 as manufactured by Master Builders Solutions, Shakopee, MN.

e. Eucothane as manufactured by Euclid Chemical, East Brunswick, NJ.

f. Or approved equal.

B. Concrete Floor Hardener

1. Liquid Floor hardener shall be:

a. MasterKure 300 WB (Lapidolith) as manufactured by BASF, Florham Park, NJ;

b. Liquid Hard as manufactured by W.R. Meadows, Hampshire, IL;

c. Diamond Hard as manufactured by Euclid Chemical Company, Cleveland, OH;

d. Or approved equal.

2. Aggregate floor hardener shall be:

a. MasterTop 110ABR as manufactured by Master Builders Solutions, Shakopee, MN;

b. Surflex as manufactured by Euclid Chemical, East Brunswick, NJ.

c. Or approved equal.

C. Non-Slip Shake-On Aggregate and abrasion resistant floor hardener:

1. Non-slip abrasion resistant floor hardener shall be:

a. Duraltex 1805 with Duraltex 1807 or broadcast silica sand as manufactured by Euclid Chemical Company, Cleveland, OH;

b. Amorseal 8100 with Armorseal Hi-Wear Additive as manufactured by Sherwin Williams, Cleveland, OH;

c. Or approved equal.

2. Non-slip shake-on aggregate shall be:

a. MasterTop 120 SR (formerly Frictex NS) as manufactured by Master Builders Solutions by BASF, Florham Park, NJ;

b. Sikafloor 2 Syn Top as manufactured by Sika, Lyndhurst, NJ;

c. Or approved equal.

D. Concrete Cleaning Solutions:

1. Board and smooth surface cleaning solution shall be:
    a. Sure-Klean Light Duty Concrete Cleaner as manufactured by PROSOCO, Lawrence, KS;
    b. Or approved equal.
2. Calcium stain cleaner shall be:
    a. PreKlean as manufactured by PROSOCO, Lawrence, KS;
    b. Or approved equal.
3. Clean/Etching Solution shall be:
    a. Sure-Klean Heavy Duty Concrete Cleaner as manufactured by PROSOCO, Lawrence, KS;
    b. Or approved equal.
4. Cleaning materials for specific stains shall be as recommended by ProSoCo, Lawrence, KS; or approved equal.

E. Water Repellent Sealer:
1. Water repellent sealer shall be:
    a. SLX-100 as manufactured by ProSoCo, Lawrence, KA;
    b. Or approved equal.

F. Patching Additive:
1. Patching additive shall be:
    a. Acryl Set manufactured by BASF/Master Builders;
    b. Or approved equal.

G. Gasket Adhesive Remover:
1. Gasket adhesive remover shall be:
    a. Asphalt and tar remover – 509 manufactured by ProSoCo, Lawrence, KA;
    b. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Concrete Floor Sealer:
1. Sealer shall be aliphatic urethane or epoxy coating with resistance to abrasion and chemical attack.

B. Concrete Floor Hardener
1. Liquid Floor hardener product and manufacturer shall be as specified in this Section.

2. Aggregate floor hardener product and manufacturer shall be non-metallic and shall be as specified in this Section.

C. Non-Slip and Abrasion Resistant Floor Hardener:

1. Non-slip abrasion resistant floor hardener for application for new concrete to harden and provide a non-slip walking surface, even when wet. The floor system shall contain flakes or broadcast 20/40 mesh silica sand for traction.

2. Shake-on aggregate floor hardener designed for application to freshly cast concrete to harden and densify the surface for resistance to wear and abrasion.

a. Product shall be a non-slip and non-rusting aggregate.

b. Non-slip aggregate shall NOT be permitted if the base concrete mix design uses air entraining agents (exceeds 3%), fly ash, slag, fibers, water reducers, accelerators or retarders. These admixtures severely diminish and slow the availability of bleed water.

D. Concrete Cleaning Solutions:

1. Cleaners shall be commercial concrete cleaners containing solvents and stain removers with no acid content.

2. Calcium stain cleaner shall be an odorless, diammonium citrate based, VOC compliant cleaner.

3. Clean/Etching Solution shall be a commercial concrete cleaner containing solvents, chloride acids and stain removers, with no more than 1.5% acid content.

4. Cleaning materials for specific stains shall be as recommended by PROSOCO, Lawrence, KS, or approved equal.

E. Water Repellent Sealer:

1. Water repellent sealer shall be a low molecular, minimum 95% solid, clear, nonyellowing, Silane or Siloxane sealer, with an oleophobic additive. Sealer shall be certified to be clear one year after application.

2. All surfaces of exposed concrete shall be sealed, except the spillway concrete and the mock-up.

3. Sealer shall be applied to all exposed-to-view concrete surfaces, including wall tops and trowelled surfaces.

F. Patching Additive:

1. Patching additive shall be a liquid, acrylic-polymer bonding agent specifically made to be integrally mixed with mortar.

G. Gasket Adhesive Remover:

1. Gasket adhesive remover shall completely remove any adhesive residue and shall not discolor concrete surface.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examine substrates, areas, and conditions where concrete finishing products will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Prepare cementitious substrates according to manufacturer's published installation instructions prior to application of concrete finishing products.

3.02 IMPLEMENTATION

A. Finishes on Formed Concrete Surfaces

1. After removal of forms, the finishes described below shall be applied in accordance with – "Concrete Finish Schedule" included in this Section. Unless specified in the Contract, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.

a. Type I - Rough or Board Form Finish: All fins, burrs and other projections left by the forms shall be removed. All holes left by removal of ties, and all other holes, depressions, or voids shall be filled solid with cement grout after first being thoroughly wetted. Honeycombs shall be chipped back to solid concrete as directed, prior to patching with cement grout. Holes shall be filled with a small tool that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface. The surface shall be thoroughly cleaned of all stains or discolorations that will interfere with the final finish.

b. Type II - Smooth Form Finish: Concrete shall be cast against forms constructed of plywood not less than 5/8 inch thick, or of boards lined with tempered hardboard not less than 3/16 inch thick,

or other approved materials. Form material shall not have torn grain, worn edges, patches of holes from previous use, or other defects which would impair the texture of the concrete surface. Form material shall utilize sheets as large as practicable in an orderly and symmetric configuration. Other aspects of the finish shall conform to the requirements of the rough form finish.

c. Type III - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type II finish. After the concrete has been predampened, a slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 30 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats and scrubbed into the surface using a rotary motion. Any surplus material shall be removed by scraping and then rubbing with clean burlap. The finish shall be kept damp for at least 36 hours after application.

d. Type IV - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type II finish no later than one day following form removal. Nor rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted.

e. Type V - Textured: Use textured forms or textured form liners of plastic, wood, or sheet metal. Secure liner panels in forms by cementing or stapling, not by methods which will permit impressions of nail heads, screw heads, washers, or the like to be imparted to the surface of the concrete. Seal edges of textured panels to each other or to divider strips to prevent bleeding of cement paste. Use a sealant that will not stain the concrete surface.

f. Type VI - Aggregate transfer: Produce aggregate transfer and other special finished that duplicate mock-ups or sample panels prepared in advance and accepted.

g. Type VII - Exposed Aggregate: Expose aggregate using one of the following methods. Provide a concrete surface that will duplicate a mock-up or a sample panel prepared in advance and accepted.

1) For a scrubbed finish, cast concrete against form faces which have been coated with a chemical retarder used in accordance with the manufacturer's recommendations. Wet the partially hardened concrete surface thoroughly and scrub with fiber or wire brushes, using water freely until the surface mortar is removed and the aggregate is uniformly exposed. Then rinse the surface with clear water. If portions of the surface have become too hard to permit uniform aggregate exposure, use dilute hydrochloric acid (one part commercial muriatic acid diluted with 4 to 10 parts water) to remove the excess surface mortar after the concrete is at least 2 weeks old. Remove the acid from the finished surface with clean water within 15 minutes after application.

2) For a blast finish, sandblast or waterblast the concrete surface to a degree sufficient to expose fine aggregates with occasional exposure of coarse aggregate, and to produce a uniform color with a maximum reveal of 1/16 inch unless specified otherwise in the Contract Documents. All surfaces with the same specified blast finish shall be done at approximately the same time after placing co concrete. Use stainless steel or plastic reinforcement supports and spacers near concrete surfaces to be blasted. Protect adjacent materials and inserts during blasting operations.

3) For a tooled finish, dress the thoroughly cured concrete surface with electric, air, or hand tools to a uniform texture removing surface mortar as specified in the Contract Documents. Then provide the surface with a hand tooled, rough or fine pointed, crandalled, or bush-hammered surface texture, as specified by Contract Documents.

h. Type VIII - Applied: When finishes of stucco, cementitious coatings, or similar troweled materials are required or permitted, prepare the surface of the concrete to ensure permanent adhesion of the finish. If the concrete is less than 24 hours old, roughen it with a heavy wire brush or scoring too. If the concrete is older, roughen the surface mechanically or by acid etching. After roughening, wash the surface free of all dust, acid, chemical retarder, and other foreign material before any final finish is applied.

B. Slab and Floor Finishes

1. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with – “Concrete Finish

Schedule" included in this Section. The Engineer shall be the sole judge of acceptability of all such finish work.

a. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required.

b. Type "B" - Scratched: Following completion of Type "A" finish, roughen the surface with stiff brushes or rakes before final set.

c. Type "C" - Floated: Following completion of Type "A" finish, do not work the concrete further until it is ready for floating. Begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disc float as soon as the water sheen had disappeared and the surface has stiffened sufficiently to permit the operation. During or after the first floating, check flatness of surface with a 10 ft straightedge applied in two or more directions. Eliminate high spots and low spots during this procedure to produce a conventional, straight edge finish, then refloat the slab immediately to a uniform texture.

d. Type "D" - Troweled: Following completion of a Type "C" finish and sufficient hardening of the concrete to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with a power trowel. Following the power trowel, hand trowel to provide a smooth, dense surface, free from defects, trowel marks, and blemishes. For surfaces exposed to wear as indicated in the Contract Documents, continue hand troweling until a ringing sound is produced as the floor is troweled.

e. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "C" finish.

f. Type "F" - Liquid Hardened Finish: Liquid hardened finish shall be provided by application of a liquid floor hardener. Floors to receive this finish shall have previously received a Type "D" finish. Liquid hardener shall be applied between 30 to 60 days after concrete placement. Surface to be treated shall be dry, clean and free of all loose dust, dirt, oil, wax, sealers and curing compounds. Application procedure shall be in accordance with manufacturer's instructions and shall consist of a three-coat treatment.

g. Type "G" - Dry Shake Hardened Finish: Aggregate hardened finish shall be provided by applying an aggregate floor hardener concurrently with the application of a Type "D" finish.

Application procedure shall be in accordance with manufacturer's instructions.

h. Type “H” - Non-Slip Finish: This finish shall be provided by applying a non-slip shake-on aggregate concurrently with the application of a Type “D” finish. Application procedure shall be in accordance with manufacturer's instructions.

C. Sealing of Concrete Floor

1. After installation of all equipment and piping, and after completion of other related construction activities, all floor slabs which are to remain unpainted and not intended to be immersed, and all equipment pads, shall be sealed with a floor sealer unless the slab has had liquid hardener applied or stated otherwise. Remove all dirt, droppage, grease, asphalt or other foreign matter with caustics and detergents as required prior to application. Sealer shall be applied in accordance with the manufacturer's recommendations.

D. Finishes on Equipment Pads

1. Formed surfaces of equipment pads shall receive a Type II finish.

2. Top surfaces of equipment pads, except those surfaces subsequently required to receive non-shrink grout and support equipment bases, shall receive a Type "D" finish, unless otherwise noted. Surfaces which will later receive non-shrink grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

E. Concrete Finish Schedule

1. Finishes shall be applied as shown on the Contract Drawings.

a. All finishes on the spillway and repaired Upper Gate Chamber (UGC) concrete are intended to closely replicate adjacent existing features.

2. General Concrete Finish Schedule:

Item	Finish Type
All concrete surfaces not exposed to public view including utility spaces	I
All exterior surfaces and interior vertical surfaces exposed to public view	IV
All interior overhead surfaces exposed to public view and interior walls of tanks	II
Surfaces to be painted	III

Item	Finish Type
Architectural finish	V, VI, VII, or VIII as indicated in the contract documents
Surfaces to receive bonded cementitious mixtures	B
Drives, interior stairs, surfaces to receive waterproofing, roofing insulation, or terrazzo, and floors of tanks	C
Floors for walking surfaces in manufacturing, storage, and warehousing areas, and floors to receive coverings	D
Sidewalks, Spillway Crest and downstream step treads	E
Garage and storage area floors	F or G
Exterior stairs, platforms, landings and ramps and interior ramps	E or H

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all materials, labor, and equipment required to provide all grout used in concrete work and as bearing surfaces for base plates as specified herein and shown on the Contract Drawings.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Implementation	10
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	11
3.05	Adjusting / Protection / Cleanup	11

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 01 35 00 - Diving Services

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1.	ASTM C109	-	Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm Cube Specimens).
2.	ASTM C150	-	Standard Specification for Portland Cement
3.	ASTM C323	-	Standard Specification for Bleeding of Concrete
4.	ASTM C531	-	Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings.
5.	ASTM C579	-	Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings.
6.	ASTM C595	-	Standard Specification for Blended Hydraulic Cements.
7.	ASTM C939	-	Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
8.	ASTM C1107	-	Packaged Dry, Hydraulic Cement Grout (Nonshrink).
9.	ASTM C1602	-	Mixing Water Used in the Production of Hydraulic Cement Concrete

10.	CRD-C 621	-	Corps of Engineers Specification for Non-shrink Grout.
11.	ISO 14025	-	Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Services of Manufacturer’s Representative

1. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall instruct the Contractor's personnel in the mixing, proper use and application of the non-shrink grout and epoxy grout.

2. The manufacturer's representative shall provide written certification that materials have been mixed and applied properly and surfaces to receive these products have been prepared properly, all in conformance with manufacturer's requirements.

3. The on-site time required for the manufacturer's representative to achieve a successful installation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of the Resident Engineer and provide written verification of the areas he has approved on each day he is at the project.

B. Grout Uses

1. The different types of grout shall be used for the applications stated below unless noted otherwise specified herein or on the Contract Drawings. Where grout is called for in this Section or on the Contract Drawings which does not fall under any of the applications stated below, non-shrink grout shall be used.

a. Cement grout (or cementitious grout) shall be used where indicated on the Drawings for the hollow-core anchors at the HLRT, grout toppings, and for patching of fresh concrete.

b. Non-shrink grout shall be used where indicated on the Drawings for abandonment and backfilling of spillway crest gate compressed airlines and boxes, around piping and conduits, and beneath base plates of equipment and structural metal framing.

c. Epoxy grout shall be used for bonding new concrete to hardened concrete.

2. New concrete surfaces to receive cement grout shall be as specified in Section 03 30 00 – Cast-in-Place Concrete, and shall be cleaned of all dirt, grease and oil-like films.
    a. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, and protection of cement grout shall be as specified in Section 03 30 00 – Cast-in-Place Concrete.
    b. Curing and protection of cement grout shall be as specified in Section 03 30 00 – Cast-in-Place Concrete.
3. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

1.06 QUALITY ASSURANCE

A. Testing Agency:
1. Testing of materials and of resulting grout for compliance with the technical requirements of the specification will be performed by QA/QC consultant employed and paid by DEP.
    a. The Contractor shall be charged by DEP for the cost of any additional tests and investigation on work performed which does not meet the specifications.
    b. Use the same testing agency designated in Section 03 30 00 – Cast-in-Place Concrete.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Shop drawings shall include, but not be limited to:
1. Material certifications and technical data sheets.
2. Samples of all materials to be used.
3. Safety Data Sheets (SDS) for all grout products.

B. The Contractor shall also submit the following:
1. Certified test results verifying the compressive strength, shrinkage and expansion requirements specified herein.
2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.
3. Contractor Grouting Work Plan that includes the materials, methods, equipment, sequencing, dewatering, quality control, inspection and testing

for all grouting activities, including underwater grouting and testing of the hollow-core anchors at the HLRT.

4. Calibration certificates for all pressure gages and flowmeters.

C. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Epoxy grout:

1. Sikadur 32 Hi-Mod as manufactured by Sika Corporation, Lyndhurst, NJ.
2. Euco #452 as manufactured by Euclid Chemical, East Brunswick, NJ.
3. Duralcrete LV as manufactured by Tamms Industries, Kirkland, IL.
4. Or approved equal.

B. Non-shrink grout shall be:

1. Euco N-S as manufactured by Euclid Chemical Company, East Brunswick, NJ.
2. Masterflow 713 as manufactured by Master Builders Solutions, Shakopee, MN.
3. Sikagrout 212 as manufactured by Sika Corporation, Lyndhurst, NJ.
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Cement Grout

1. Cement grout shall be composed of Portland cement, sand and water. The sand to be used shall be selected to suit the spacing for placement. Where sand is not usable, the grout shall be composed of cement and water only.
2. Gradation of sand and mix proportioning shall be in accordance with the following table for grouts using natural sands and having a minimum 28-day compressive strength of 4,500 psi. For higher strength grouts or those using manufactured sands, strength shall be established by trial mixes.

a. Gradation for Natural Sand:

Sieve Size	Spaces less than one (1) inch	Spaces one (1) inch or more
Passing 3/8		100
Passing 4	100	95-100
Passing 8	95-100	80-100
Passing 16	70-100	50-85
Passing 30	40-75	25-60
Passing 50	10-35	10-30
Passing 100	2-15	2-10

Passing 200	--	--

b. Mix Proportioning:

	Non-Air Entrained Grouts (Maximum 4 Percent Entrapped Air)		Air Entrained Grouts (Air 8 Percent to 10 Percent)	
By Weight	Spaces less than one (1) inch	Spaces one (1) inch or more	Spaces less than one (1) inch	Spaces one (1) inch or more
Cement (bags)	10.8	10.5	11.3	11.0
Sand (lb)	2150	2240	1930	1990
Maximum water (gals)	59.5	57.8	57.5	55.8
Maximum water (gals per bag)	5.5	5.5	5.1	5.1

	Non-Air Entrained Grouts (Maximum 4 Percent Entrapped Air)		Air Entrained Grouts (Air 8 Percent to 10 Percent)	
By Volume	Spaces less than one (1) inch	Spaces one (1) inch or more	Spaces less than one (1) inch	Spaces one (1) inch or more
Cement	1	1	1	1
Sand (dry rodded)	1.85	2.10	1.6	1.7
Sand (damp & loose)	2.30	2.35	2.0	2.1

By Volume	Non-Air Entrained Grouts (Maximum 4 Percent Entrapped Air)		Air Entrained Grouts (Air 8 Percent to 10 Percent)	
	Spaces less than one (1) inch	Spaces one (1) inch or more	Spaces less than one (1) inch	Spaces one (1) inch or more
Maximum water (gals per bag)	5.5	5.5	5.1	5.1

3. Water shall be kept to a minimum, the amounts noted in the preceding table are the maximum for grout. Proportioning by volume shall be limited to small quantities mixed at the job site.

4. White Portland cement shall be mixed with the Portland cement as required to match the color of adjacent concrete.

B. Non-Shrink grout

1. The non-shrink grout material shall be an approved ready to use non-metallic mixture requiring only water for use at the job site. The compressive strength of 2-inch cubes shall be 4,500 psi at 7 days.

2. Non-shrink grout shall conform to CRD-C 621 and ASTM C1107, Grade B or C when tested at a maximum fluid consistency of 30 seconds per ASTM C939 at temperature extremes of 45 degrees Fahrenheit and 90 degrees Fahrenheit and an extended working time of 15 minutes.

3. Non-shrink grout product and manufacturer shall be as specified in this Section.

4. Non-shrink grouts depending on oxidation to limit shrinkage and containing additives such as iron or steel particles shall not be used.

C. Epoxy Grout

1. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

2. Epoxy grout product and manufacturer shall be as specified in this Section.

D. Dry Pack

1. Dry pack (to be packed or tamped in place) shall be made at no slump consistency.
2. When mixing the batch, only enough water shall be added to the dry materials to produce a rather stiff mixture, then additions of water may be made in small increments until the desired consistency is obtained.

E. Curing Materials

1. Curing materials for cement grout shall be as specified in Section 03 30 00 – Cast-in-Place Concrete and as recommended by the manufacturer for prepackaged grouts.

F. Hollow-Core Anchors

1. Hollow-Core Anchor Grout:

a. Grout mixes for grouting anchor holes shall consist of a mixture of Portland cement and water. Cement shall conform to ASTM C150 for Type II cement or ASTM C595 for Type IL cement. The cement grout mix design shall be the responsibility of the Contractor. The water content shall be the minimum necessary for proper placement, but the water-cement ratio shall not exceed 0.50 by weight. Final proportions of materials shall be based on results of tests made on sample mixtures of grout. The Contractor shall perform bleed tests in accordance with ASTM C232 and should not exceed 1%. The minimum 7-day compressive strength of 2-inch cubes, molded, cured, and tested in accordance with ASTM C109 shall be 4,500 psi. Prior to grouting, the Contractor shall submit to the Engineer, for approval, the final grout mix design including final proportions of all materials, water-cement ratio and the results of all tests made on sample mixtures of the grout.

b. Grout mixture shall be in accordance with the anchor bar manufacturer recommendations.

c. An antiwashout admixture shall be added to all grout mixes used for placement underwater. Antiwashout admixtures must meet the requirements outlined in Section 03 30 00 – Cast-in-Place Concrete.

G. Water

1. Water furnished for grouting operations must meet the requirements of Section 03 30 00 – Cast-in-Place Concrete.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Installation

1. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency shall be such that the grout is plastic and moldable but will not flow.
2. Measurements for cement grout shall be made accurately by weight or by volume using containers. All measurements shall be made in a manner satisfactory to the Engineer. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.
3. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted, be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped.
4. For grouting beneath base plates, grout shall be poured from one side only and shall flow across to the open side to avoid air-entrapment.
5. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications.
2. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C579, Method B, at intervals during

construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.

4. Routine quality control tests shall be conducted during construction on anchor grout as described in this Specification and Section 03 21 00 – Reinforcing Steel. A set of three specimens will be made for compression testing at seven days, 28 days, and any additional time period as appropriate.

B. All grout which has already been placed and which fails to meet the requirements of this Section is subject to removal and replacement by the Contractor at no additional cost to DEP.

C. Duties of the testing agency and Contractor shall be the same as those specified in the Field Quality Control section of Section 03 30 00 – Cast-in-Place Concrete when applicable to grout. All duties shall be performed in accordance with standard procedures and protocols as specified herein and shown on the Contract Drawings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 04 01 00 – MAINTENANCE OF MASONRY
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Masonry and stonework restoration and cleaning as specified herein shall include, but not be limited to, bluestone masonry (stone masonry) salvage and reuse, bluestone masonry (stone masonry) tuck pointing, and all accessories and appurtenances.

B. Masonry and stonework (stone masonry) restoration and cleaning shall be provided as required in the Contract Drawings and Specifications and as required for a complete installation.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 04 05 00 - Common Work Results for Masonry

B. Section 04 40 00 - Stone Assemblies

1.04 REFERENCES

A. Acronyms: Not Used.

B. Reference Standards:

1. National Park Service, US Department of the Interior - Repointing Mortar Joints in Historic Masonry Buildings, Preservation Brief II.

2. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar

3. ASTM C 150 - Standard Specification for Portland Cement

4. ASTM C 270 - Standard Specification for Mortar for Unit Masonry

1.05 DESCRIPTION

A. Environmental Requirements

1. Temperature: Stone masonry shall not be repointed, caulked, washed down, or wetted when temperature may drop below 40 degrees F within 24 hours.

2. Hot Weather Requirements for Restoration Mortar: Protect repair mortar from direct sunlight and wind. Do not use or prepare mortar when ambient air temperature is above ninety (90) degrees Fahrenheit.

3. Air Quality: Cleaning processes creating dust or dirt shall not be performed when wind is in excess of 10 miles per hour.

4. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.06 QUALITY ASSURANCE

A. Experience: Stone masonry restoration and cleaning work shall be performed by a company with a minimum of five years documented experience in this type of work.

B. Installer Certification: All repairs should be performed by a trained installer holding a Certification from the product manufacturer. Contractor shall maintain proof of this credential for each installer at the Site at all times and be prepared to present this to DEP upon request.

C. Provide Mockups for each repair type.

1. Prepare mockup of exterior repointing to demonstrate aesthetic effects and to set quality standards for materials and execution. Mockup to be in one or separate locations approved by the Engineer, for a total of 9 square feet of area.

D. The color and finish and joint tooling shall match existing in each repair location.

E. Repointing mortar joints is subject to the guideline of National Park Service, US Department of the Interior - Repointing Mortar Joints in Historic Masonry Buildings, Preservation Brief II.

1.07 SUBMITTALS

A. Qualifications and Experience: Submit list of a minimum of 5 completed projects of similar size and complexity to this Work. Include for each project:

1. Project name and location
2. Name of owner
3. Name of engineer
4. Type of restoration
5. Approximate area of restoration work
6. Date of completion

B. The Contractor shall prepare and submit Shop Drawing and reference materials for approval of the Engineer. Submittals shall include but not be limited to the following:

1. Catalog cuts.
2. Drawings.
3. Literature: The Contractor shall submit literature showing the type of materials and equipment to be used in all stone masonry cleaning. This shall include the manufacturer's technical data for each product specified. Include test data and certifications substantiating that products comply with requirements.
4. Test Patches: The Contractor shall clean a 24”x24” area of existing stone surface to be cleaned. The test patch shall be approved by the Engineer before beginning cleaning of existing stone surfaces.
5. Restoration Program: Submit written program for each phase of restoration process including protection of surrounding material on building and site during operations. Describe in detail material methods and equipment to be used for each phase of restoration work.
6. Methods of Stone Removal – Submit a description of the tools to be used for stone removal.
7. Methods of Mortar Removal - Submit a description of the tools to be used for mortar removal at areas of tuck pointing.
8. Submit written plan and diagrams for method of containment of water used for cleaning and its disposal.
9. Samples – Of all materials submitted.

C. Envision Requirements: **TBD**

1. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Restoration and cleaning materials delivered and stored at the site shall be from approved manufacturers and sources only. Restoration and cleaning materials shall be delivered and stored in manufacturer's packaging, and shall include all instructions for use.

1. Store materials in a secure, indoor facility.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide tuck pointing products as manufactured by the following:

1. Jahn Mortars, distributed by Cathedral Stone Products, Inc., 7266 Park Circle Drive, Hanover, MD 21076.

2. Glen-Gery, Glenwood Mason Supply Co., Inc., 4100 Glenwood Road, Brooklyn, NY 11210.

3. Lancaster Lime Works, 1251 Beaver Valley Pike, Willow Street, PA 17584.

4. Or an approved equal.

2.02 MATERIALS / EQUIPMENT

A. Tuckpoint Mortar: Use Type S (1000-1800 maximum psi) for Bluestone. Otherwise, mortar materials shall be as specified in Section 04 05 00 - Common Work Results for Masonry.

B. Use Tuckpoint Mortars that are premixed cementitious repair materials formulated to match existing color and texture and that do not contain acrylic, latex, or other synthetic polymer additives. Mix with clean, potable water.

C. Cleaning Solution: No chemical cleaners, including acid-based washes, may be used. Stone masonry shall be washed with clean water and soap powder using stiff bristle fiber brushes. All used water is to be recovered and disposed of.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. Not Used

B. Preparation

1. Adjacent Elements: Elements surrounding the work of this Section, which shall include, but not be limited to, fixtures, fittings, finishing hardware, roof and roofing materials, and flashing, shall be protected from damage or disfiguration.

2. Occupied Areas: Occupied areas shall be closed off from the work of this Section by means of dustproof and weatherproof temporary partitions.

3. Demolition: Where indicated on the Contract Drawings, stone masonry shall be cut out in a manner to prevent damage to any adjacent remaining materials. All loose or unsound adjoining masonry, mortar, or stone shall be cut away to provide firm, solid bearing for new work.

3.02 IMPLEMENTATION

A. Stone Masonry Rebuilding:

1. Rebuilt stone masonry shall be built in to match and align with existing, with all joints and coursing true and level, and faces plumb and in line. All anchors, ties, reinforcing, stone cramps and dowels and flashings shall be correctly located and built in.

B. Stone Masonry Replacement:

1. Stonework replacement shall be in accordance with Section 04 40 00 - Stone Assemblies.

C. Stone Masonry Repair:

1. Repair of individual stones is Not in Scope.

D. Stone Masonry Tuck Pointing:

1. Preparing Joints: Masonry mortar joints shall be raked out by hand cutting or grinding to a depth of 5/8-inch to allow new mortar to bond directly to the masonry units on both sides of the joint. Following the removal of mortar, the joints and edges of masonry units shall be thoroughly cleaned of all dust and loose mortar. Prior to tuck pointing with the mortar specified,

the joints shall be thoroughly wetted down, assuring that edges and backup are sufficiently moist. This is particularly important during hot, windy, summer weather. Where special products are specified for pointing mortar, the work shall be prepared and performed in strict compliance with the manufacturer's recommendations. Do not tuck point during freezing weather.

2. Pointing: The cutout joints shall be completely filled with mortar. Care shall be exercised such that too much mortar is not applied at one time. Small amounts of mortar shall be placed and forced back to the foundation of the joint with a tool narrower than the joint being pointed. Joint tooling and profile and color and texture to match existing.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning

1. No chemical cleaners, including acid-based washes, may be used. Stone masonry shall be washed with clean water and soap powder using stiff bristle fiber brushes. All used water is to be recovered and disposed of**.**

END OF SECTION

SECTION 04 05 00 – COMMON WORK RESULT FOR MASONRY
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Mortar and masonry grout as specified herein include, but are not limited to, Portland Cement, lime, sand, coarse aggregate, admixtures for use in setting mortar and masonry grout, and appurtenances.

B. Mortar and masonry grout shall be provided as indicated on the Contract Drawings, specified herein, or as required for a complete installation.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 04 01 00 – Maintenance of Masonry (For Pointing Mortar)

B. Section 04 40 00 – Stone Assemblies

1.04 REFERENCES

A.	ASTM C91	-	Standard Specifications for Masonry Cement
B.	ASTM C144	-	Standard Specification for Aggregate for Masonry Mortar
C.	ASTM C150	-	Standard Specification for Portland Cement
D.	ASTM C207	-	Standard Specification for Hydrated Lime for Masonry Purposes
E.	ASTM C270	-	Standard Specification for Mortar for Unit Masonry
F.	ASTM C404	-	Standard Specification for Aggregates for Masonry Grout
G.	ASTM C476	-	Standard Specification for Grout for Masonry
H.	ASTM C595	-	Standard Specification for Blended Hydraulic Cement
I.	ASTM C780	-	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
J.	ASTM C1329	-	Standard Specification for Motor Cement
K.	ASTM C1019	-	Standard Test Method for Sampling and Testing Grout
L.	NYCBC	-	Section BC 2103 Masonry Construction Materials, BC 2104 Construction

1.05 DESCRIPTION

A. Where questions of compliance with the requirements of this Section arise, the specifications for mortar properties shall take precedence over the specification for mortar proportions.

B. No change shall be made in the proportions established for mortar approved under the specifications for mortar properties nor shall material with different physical characteristics be utilized in mortar used in the work unless compliance with the specifications for mortar properties are re-established by Shop Drawing data submission to Engineer.

C. Two different air-entraining materials shall not be combined in mortar or grout.

D. Sustainable Design Requirements:

1. Recycled Content of Mortar and Masonry Grout Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 15 percent.

E. Project-specific system/ design requirements will be provided in the Contract, if necessary, to supplement requirements given herein or Contract Drawings.

1.06 QUALITY ASSURANCE

A. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

B. The Contractor shall engage an independent testing agency to conduct tests specified herein and as follows:

1. Mortar: Mortar tests shall be performed in accordance with ASTM C270.

2. Grout: Grout tests shall be performed in accordance with ASTM C1019.

C. Requirements of Regulatory Agencies for Fire-Ratings: Not Used.

1.07 SUBMITTALS

A. The Contractor shall submit the Shop Drawings for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Product Data: Manufacturer's specifications and installation instructions for proprietary materials.

2. Certificates: Notarized certificates that the following comply with the specified requirements:

a. Portland Cement

b. Hydrated lime

c. Mortar and grout aggregates

3. Design Mix: Certified design mix for mortar and grout.

4. Test Results: Results of mortar and grout tests as specified herein and as specified in referenced standards.

5. Samples: Not used.

6. Construction: Weight slips for grout materials at time of delivery.

7. Schedule of locations where each mortar and grout type will be used in the work.

B. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Recycled Content. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

c. The percentage (by weight) of post-consumer and pre-consumer recycled content.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Materials shall not be delivered to the Site before the time of installation.

2. Materials delivered and stored at the Site shall be from approved manufacturers and sources only.

3. Materials shall be delivered in sufficient quantities to allow continuity of the work.

B. Storage of Materials:

1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.

2. Cement shall be stored in weathertight containers that exclude moisture and contaminants.

3. Hydrated lime shall be stored in weathertight containers that exclude moisture and contaminants.

4. Aggregates shall be kept clean and free from other materials during transportation and handling. Aggregate shall be stockpiled in a manner to prevent segregation.

5. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the Site before being incorporated into construction systems.

C. Handling of Materials:

1. Materials shall be handled in such a manner to avoid damage or breakage.

2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the Site and shall not be incorporated into the work.

3. Materials shall be handled in such a manner to prevent inclusion of contaminants.

4. Packages or containers shall not be opened until all preparatory work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mortar and masonry grout materials shall be as manufactured by:

1. Glen-Gery, Glenwood Mason Supply Co., Inc., 4100 Glenwood Road, Brooklyn, NY 11210.

2. Spec-Mix, Suite 160, 1230 Eagan Industrial Road, Eagan, MN 55121

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Portland Cement:

1. Provide Type I or III Portland Cement that conforms to the requirements of ASTM C150.

2. Provide nonstaining Portland Cement of natural color or of the color required to be compatible with the required colored mortar pigment selected by Engineer.

3. Mortar color: Natural, gray.

B. Hydrated Lime: Provide Type S hydrated lime that conforms to the requirements of ASTM C207.

C. Sand for Mortar: Provide natural sand that conforms to the requirements of the following:

1. ASTM C144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

D. Aggregates for Grout: Provide fine and coarse aggregates that conform to the requirements of ASTM C404, ASTM C476.

E. Water: Provide clean and potable water from approved sources.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Mixes for Mortar: Provide mortar that conforms to the requirements of ASTM C270, except as modified herein, and of the type and color specified in the Contract.

1. Provide a cement-lime mortar; masonry cement mortars are not acceptable.

2. Calcium chlorides are not permitted.

3. Admixtures shall not be used unless specifically directed by the Contract.

4. Grout: Provide grout that conforms to the requirements of ASTM C476, ASTM C404 for fine or coarse grout.

B. Mixes for Grout: Provide grout that conforms to the requirements of ASTM C476, ASTM C404 for fine or coarse grout.

1. Fine grout shall be used for filling spaces with openings less than 2 inches.

2. Course grout shall be used for filling spaces with openings greater than 2 inches.

C. Measurement of Materials:

1. Cement and Hydrated Lime: Batched by the bag.

2. Sand: Batched by volume in suitably calibrated containers. Make allowance for bulking and consolidation, and for weight per cubic foot of contained moisture.

3. Proportion of Volumetric Mixtures: One 94-pound sack of Portland cement and one 50-pound sack of hydrated lime constitute nominal one cubic foot.

4. Shovel measurement: Not permitted.

D. Mortar:

1. All cementitious materials and aggregates shall be mixed between three and five minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Mortar shall not be hand mixed.

2. Limit batch size to avoid retempering.

3. Mortar that has begun to stiffen or is not used within two hours after initial mixing shall not be used.

4. The mixer drum shall be completely emptied before recharging the next batch.

E. Mortar Temperature:

1. For temperatures below 40 degrees F mortar materials shall be heated to protect both mortar and completed work from freezing.

2. When outside air temperature is:

a. 25 to 40 degrees F: Mixing water and sand shall be heated to produce mortar temperature between 40 and 120 degrees F. Temperatures of mortar on boards shall be maintained above freezing.

b. Below 25 degrees F: Masonry shall not be installed.

3. Ideal mortar temperature is 70 degrees F $\pm$10 degrees F. Mixing temperature selected shall be maintained within 10 degrees F.

4. Antifreeze compounds or calcium chloride in mortars shall not be used to lower the freezing point or accelerate setting.

F. Grout: Grout shall be mixed in accordance with the requirements of ASTM C476.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Prior to placing mortar or grout, remove laitance, loose aggregate and any substance that may prevent mortar or grout from bonding to the foundation.

3.02 INSTALLATION

A. Installation of mortar and grout shall be in accordance with the requirements of related sections.

3.03 FIELD TESTING / QUALITY CONTROL

A. Mortar shall be prepared and tested for preconstruction and construction evaluation in accordance with the requirements of ASTM C780. Specimens for construction evaluation shall be prepared a minimum of every 500 square feet of masonry construction.

B. Grout shall be prepared and tested for construction evaluation in accordance with the requirements specified in ASTM C1019 and NYCBC Section BC 2104. Specimens shall be prepared a minimum of every 100 cubic feet of grout placed.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. If any adjustment are needed after installation, the Contractor shall make those adjustments with care, to maintain consistency with the work completed.

B. It is the Contractor's responsibility to protect all completed work in and around the site. Any damage done to the completed work during construction shall be fixed at no extra charge to the City.

C. The Contractor is also responsible for cleaning up after the work under this Section has been completed, to maintain a clean and neat site.

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Stone assemblies as specified herein include but are not limited to rebuilding of ashlar coursed bluestone with reuse of existing stone masonry and new bluestone pillar caps; including new reinforcement, anchorage, and all accessories and appurtenances.

B. Stone masonry unit items shall be provided as required in the Contract Drawings and Specifications and as required for a complete installation.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	4
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 04 01 00 - Maintenance of Masonry (Rebuilding Stone Masonry)

B. Section 04 05 00 - Common Work Results for Masonry

C. Section 07 90 00 - Joint Protection

1.04 REFERENCES

A. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes

1.05 DESCRIPTION

A. Project-specific system description or design requirements for the work of this Section will be provided in the Contract, if necessary, to supplement the requirements given herein or in the Contract Drawings.

1.06 QUALITY ASSURANCE

A. ASTM Testing for Stone: Not Used.

1.07 SUBMITTALS

A. The Contractor shall prepare and submit Shop Drawings and reference materials for approval of the Engineer. Submittals shall include, but not be limited to the following:

1. Samples: Quarried Bluestone.

2. Shop Drawings: The Contractor shall submit drawings indicating reuse and rebuilding of and new stone masonry, along with arrangement and provisions for jointing, supporting, anchoring, reinforcing, and bonding stonework. Shop Drawings shall include relationship with, attachment to, and reception of all related Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Materials shall not be delivered to the project site before the time of installation.

2. Stone masonry unit materials delivered and stored at the site shall be from approved manufacturers and sources only.

3. Materials shall be delivered in sufficient quantities to allow continuity of the Work.

B. Storage of Materials:

1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.

2. All stone masonry units shall be stored on non-staining wood skids or pallets under shelter, or covered with non-staining waterproof membrane so as to protect these materials from soil and weather.

3. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the project site before being incorporated into construction systems.

C. Handling of Materials:

1. Materials shall be handled in such a way to avoid damage or breakage.

2. Stone masonry units shall be lifted using wide-belt slings. Pinch bars, wrecking bars, wire ropes, or ropes containing tar or other substances which might cause staining or damage shall not be used.

3. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be permanently removed from the project site and shall not be incorporated into the Work.

4. Materials shall be handled in such a manner so as to prevent inclusion of foreign materials.

5. Packages or containers shall not be opened until all necessary preparatory work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

6. Rejection: Stone masonry units that are warped, cracked or of inferior quality will be rejected. Such items shall be removed from the site and not offered again for inspection.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used.

2.02 MATERIALS / EQUIPMENT

A. Ashlar Coursed Bluestone: Stone shall be provided by reuse of existing stone.

1. Bed thickness to match existing.

2. Course heights to match existing.

B. Stone Pillar Caps: Stone shall be new quarried bluestone.

1. Stone shall match the original existing historic materials as closely as possible for composition, uniformity of color, texture, strength, size,

veining, finishing, porosity and other aspects of the stone unit to be used for replacement is to be matched as closely as possible the original stone unit.

2. All stone units are to be thoroughly checked for cracks, spalling, efflorescence, mineral discolorations, etc.

3. Stone to be cut and set with bedding planes horizontal.

4. Documentation indicating the quarry from which the stone was extracted and dates of actual mining of stone unit shall be provided upon the stone units delivery to the job site.

5. Provide bluestone from the following quarries:

   a. Sonny and Sons Stone Company, Downsville, NY.

   b. Hepco Quarries, Windsor, NY.

   c. Any other quarry with bluestone that meets Project requirements.

C. Metal Accessories: The Contractor shall provide Type 316 stainless steel for anchors, anchor slots, ties and reinforcement.

D. Rigid Anchors: Rigid ASTM A276, Type 316, stainless steel anchors shall be 1-inch wide by 3/16-inch thick.

E. Weep Holes: Not Used.

F. Anchors, Cramps and Dowels for Stone: All anchors, cramps and dowels for stone shall be of Type 316 stainless steel.

G. Mortar Materials: Mortar materials shall be in accordance with Section 04 05 00 - Common Work Results for Masonry for setting mortar and Section 04 01 00 – Maintenance of Masonry for pointing and repointing mortar.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Stone Setting: Stone shall be set in nonstaining mortar, true to level, with each joint entirely filled with mortar unless otherwise indicated. Plastic buttons shall be used where necessary to prevent crushing of mortar under heavy blocks. Heavy stone or projecting courses shall not be set until the mortar in courses underneath have

hardened. All projecting stone shall be securely braced until the wall above it is built and adequately cured.

B. Stone Joints: All joints shall be a uniform 3/8-inch in thickness. Joint pointing to be as detailed on drawings and in Section 04 01 00 Maintenance of Masonry. Provide sealant joints where indicated on drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting

1. Stone masonry unit components which are dislodged, damaged, expanded, broken, penetrated or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Specifications and properly protected as specified.

B. Protection

1. All components of the Work shall be protected from detrimental weather and damage until construction operations are completed and acceptable to Engineer. Protective boards shall be provided at exposed external corners susceptible to damage by construction activities, without damaging completed work.

2. Work which cannot for reasons acceptable to Engineer be covered with complete construction system before onset of weather detrimental to the Work shall be completely covered and protected in such a manner as to deflect water and weather from the installation without damaging adjacent Work.

3. Stone masonry units shall be protected from all damage and abuse from all other Contractors and installers involved in the Work until Final Acceptance by the City.

C. Cleanup

1. After mortar has set, new stone masonry unit work shall be cleaned as follows:

a. All excess mortar and mortar smears shall be removed. All defective mortar shall be removed and replaced, matching adjacent work. Nonmetallic tools shall be used in all cleaning operations.

b. Stone masonry units shall be washed with clean water and soap powder using stiff bristle fiber brushes. All used water is to be

recovered and disposed of. No chemical cleaners, including acid-based washes, may be used.

END OF SECTION

SECTION 05 05 13.01 – GALVANIZING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section furnishes requirements for all iron or steel materials which are to be galvanized as shown on the Contract Drawings.

B. All galvanizing shall be done by the hot-dip process.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

D. Attachments

1. Table 1 Schedule of Hot-Dip Galvanizing Requirements

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Acronyms

1. American Galvanizers Association (AGA)
2. Canadian Standards Association (CSA)

B. Reference Standards:

1. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
2. ASTM A90 - Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
3. ASTM A111 - Zinc-Coated (Galvanized) "Iron" Telephone and Telegraph Wire
4. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric
5. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire
6. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
7. ASTM A143 - Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
8. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
9. ASTM A239 - Test Method for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)
10. ASTM A384 - Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
11. ASTM A385 - Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
12. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric
13. ASTM A475 - Zinc-Coated Steel Wire Strand
14. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
15. ASTM A780 - Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
16. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
17. ASTM B6 - Specification for Zinc

18. ASTM E536 - Test Methods for Chemical Analysis of Zinc and Zinc Alloys
19. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
20. CAN/CSA G164-M92 - Hot Dip Galvanizing of Irregularly Shaped Articles.

1.05 DESCRIPTION

A. Tests

1. General: Samples of galvanized articles shall be taken as specified in the appropriate ASTMs listed in Table 1. Galvanized articles shall be tested to determine the following qualities of the coating:
   a. Thickness of coating
   b. Adherence
   c. Uniformity.
2. Thickness of the zinc coating may be tested either by the weighing or stripping methods in conformity with the requirements set forth in Table 1.
3. Adherence of zinc coating shall be tested by the method indicated in the appropriate ASTMs listed in Table 1.
4. Uniformity:
   a. Galvanized articles will be subjected to visual examination to determine uniformity of work.
   b. In the event the Engineer determines that such examination is not conclusive, the article shall be given the Preece test in conformity with ASTM A239.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Galvanizing shall be done in a plant having sufficient facilities to produce the quality of coatings herein specified and ample capacity for the volume of work required.
2. The plant shall follow the procedures in the Quality Assurance Manual of the AGA.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings for approval by the Engineer. The submittals shall include, but not be limited to:

1. The producer's or supplier's certification that the galvanized articles were manufactured, sampled, tested and inspected in accordance with the applicable standards specified herein and that the articles meet these requirements.

B. A report of the test results shall be furnished to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling

1. Galvanized articles shall be shipped and handled in a manner which will avoid damage to the zinc coating.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Zinc used for galvanizing shall conform to ASTM B6, and shall be at least equal to the grade designated as Prime Western.

B. Maximum amount of aluminum added to a galvanizing bath shall not exceed 0.01 percent.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Preparation of Materials

1. Structural steel products shall be safeguarded against embrittlement in accordance with ASTM A143.

2. Casting surfaces to be galvanized shall be sand blasted or ground smooth. When a smooth cast is required, castings shall be tumbled and all high spots ground flush. Castings shall be normalized to prevent cracking. Malleable iron shall be safeguarded against embrittlement by pre-annealling.

3. Steel work shall be pre-cleaned utilizing a caustic bath, acid pickle and flux or shall be blast cleaned and fluxed to obtain an acceptable surface for quality hot dip galvanizing.

3.02 IMPLEMENTATION

A. Hot-Dip Galvanizing Requirements

1. The Work shall conform to the requirements in Table 1 - Schedule of Hot-Dip Galvanizing Requirements.

2. Quality of Coating:

a. The zinc coating shall meet the standards set forth in Table 1, ASTM A385. The coating shall adhere firmly to the surface of the base metal, be continuous, uniform in thickness, and of the quality of finish specified.

b. All rejected materials shall be stripped and regalvanized before resubmitting for inspection and test.

B. Repair of Galvanized Coating

1. Galvanized coatings that are abraded or damaged shall be repaired in accordance with ASTM A780.

2. The extent of the area to be repaired and the method of repair to be used shall be approved by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

ATTACHMENT 1 -- SECTION 05 05 13.01 – GALVANIZING
CONTRACT [CONTRACT CAT-475]

TABLE 1 - SCHEDULE OF HOT-DIP GALVANIZING REQUIREMENTS							
CLASS OF WORK	ZINC		TEST OF ZINC COATING				COATING THICKNESS
	Slab and Chemical Analysis	Coating	Thickness By Weight	Thickness By Stripping	Adherence	Uniformity	Oz. Per Sq. Ft. Minimum
IRON & STEEL STRUCTURAL Rolled, pressed and forged, shapes, castings, plates, bars and strips Gratings, iron and steel	B6, E536	A123	A123	A90, G164-M92	A123	A123, A239	Table 1, A123
SHEETS Iron and steel	B6, E536	A653	A653, A924	A90, A924	A653	A239	Table 1, A653
HARDWARE • Castings of malleable iron and steel • Rolled, pressed, forged articles • Threaded fasteners • Very small work: rivets, nails, tacks, pins, small bolts and screws, stove bolts • Turnbuckles and similar work • Chain	B6, E536	A153	A153	A90,	A153	A153, A239	Table 1, A153
WIRE • Line wire • Fencing wire • Fencing fabric, chain link • Barbed wire • Strand wire	B6, E536 B6, E536 B6, E536 B6, E536 B6, E563	A111 A116 A392 A121 A475	-- -- -- -- --	A90 A90 A90 A90 A90	A111 -- -- -- A475	A111 -- -- -- A475	Table 1, A111 Table 3, A116 Tables 1 and 2, A392 Table 3, A121 Table 4, A475

ATTACHMENT 1 -- SECTION 05 05 13.01 – GALVANIZING
CONTRACT [CONTRACT CAT-475]

TABLE 1 - SCHEDULE OF HOT-DIP GALVANIZING REQUIREMENTS							
CLASS OF WORK	ZINC		TEST OF ZINC COATING				COATING THICKNESS
	Slab and Chemical Analysis	Coating	Thickness By Weight	Thickness By Stripping	Adherence	Uniformity	Oz. Per Sq. Ft. Minimum
PIPE	B6, E536	A53	--	A90	A53	--	1.8 oz. per sq. ft
ELECTRICAL CONDUIT (Rigid Steel)	Shall comply with ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.						

Notes Applicable to Table1:
1. Prefixes A, B and E identify ASTM Specifications; prefix G identifies CSA Standard .
2. Galvanized articles shall not be subject to wiping or scraping processes which may reduce the thickness of zinc coating.
3. Small hardware items shall be centrifuged to remove excess bath metal.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials and equipment required to perform all structural welding as specified herein, and as indicated on the Contract Drawings. The Work shall include, but not limited to, the following items:

1. Procedure specifications.
2. Procedure qualifications.
3. Welder, welding operator and tacker qualifications.
4. Inspection.
5. Testing and repair of defective welds.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	8
1.08	Delivery, Storage, and Handling	8
1.09	Spare Parts, Special Tools, and Supplies	8
1.10	Warranty	8
PART 2	PRODUCTS	9
2.01	Manufacturers	9
2.02	Materials / Equipment	9
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	9
PART 3	EXECUTION	9
3.01	Examination / Preparation	9
3.02	Application	9
3.03	Field Testing / Quality Control	9
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 12 00 - Structural Steel Framing

1.04 REFERENCES

A. Definitions

1. Definitions of welding terms shall be in accordance with ANSI/AWS A3.0.

B. Reference Standards:

1. AISC-04 - Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design
2. ANSI/AWS A2.4 - Standard Symbols for Welding, Brazing and Nondestructive Examination
3. ANSI/AWS A3.0 - Standard Welding Terms and Definitions
4. ANSI/AWS D1.1 - Structural Welding Code - Steel
5. ANSI/AWS D1.4 - Structural Welding Code - Reinforcing Steel
6. AWS Z49.1 - Safety in Welding and Cutting and Allied Processes
7. American Institute of Steel Construction (AISC)
8. American Welding Society (AWS)
9. New York City Building Code (NYCBC)

1.05 DESCRIPTION

A. All welding shall be performed in accordance with ANSI/AWS D1.1 and ANSI/AWS D1.4. No welding shall be performed when the base metal temperature is lower than 32 degrees Fahrenheit.

B. Welding shall not be started until welding procedures, welders, welding operators and tackers have been qualified and copies of all records and reports submitted and approved by the Engineer.

C. The Contractor shall be responsible for the quality of welding and shall maintain records of the test results obtained from the welding procedure, welder, welding operator and tackers performance qualifications.

D. Each weld shown or indicated on the Contract Drawings shall be made as specified on the approved procedure specifications provided to cover each type of weld. Welding of any special steel shall conform to the written instructions of the steel manufacturer.

E. Test specimens shall be prepared by the Contractor for each type of welded joint as designated in Article 1.08, Welding Procedure Qualifications. Destructive tests of specimens for procedure and welder qualifications shall be conducted in accordance with ANSI/AWS D1.1, Section 4, Qualifications, and the requirements specified herein.

F. Symbols

1. Symbols on the Contract Drawings, shop drawings and erection drawings shall be in accordance with ANSI/AWS A2.4.

G. Safety Precautions

1. Safety precautions during welding shall conform to AWS Z49.1.

H. Welding Requirements

1. Contract Drawings will include the following information:

   a. Size, length, type and location of welds.

   b. Location of welds for which non-destructive testing is required. When location of non-destructive testing is not shown, it will be indicated by the Engineer in the field.

2. Workmanship and techniques for welded construction shall conform to the requirements of ANSI/AWS D1.1 and AISC-04. When ANSI/AWS D1.1 and AISC-04 are in conflict, the requirements of ANSI.AWS D1.1 shall govern.

3. Welding of steel reinforcing bars shall conform to the requirements of ANSI/AWS D1.4 and the Contract Documents. Welds shall develop a minimum of 85,000 psi tensile strength. Bars to be welded shall be cut by means of an oxyacetylene torch or by sawing. Ends shall be free of dirt, oxide scale, oil, grease, or other foreign matter. Sheared ends of bars shall be trimmed back at least 1/2-inch by sawing or flame cutting. Preheat and interpass temperature shall conform to ANSI/AWS D1.4. Bars having a carbon equivalent content in excess of 0.50 percent shall not be welded.

4. Where dissimilar strengths of steel are welded together, the procedure used shall be the same as the one used for the lower strength steel.

5. All groove welds shall be 100 percent complete penetration welds as defined in ANSI/AWS D1.1 or shown in ANSI/AWS D1.4 for reinforcing steel, regardless of whether a backup plate is shown or whether the supplementary backing weld or melt-through symbol is included, in each groove-weld symbol shown unless partial penetration is included in the weld symbol.

6. Gun welded studs shall conform to the requirements of ANSI/AWS D1.1, Section 7.

7. Upon completion of welding, all weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

I. Standard of Acceptance

1. Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of ANSI/AWS D1.1, ANSI/AWS D1.4 and the Contract Drawings.
2. The welding shall be subject to inspection and tests in the shop and at the Project Site. Inspection and tests in the shop will not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality.
3. All welding exhibiting any cracks, either in the weld metal or the parent metal, will be rejected.
4. Incomplete fusion or lack of penetration will not be allowed, and the weld will be rejected.
5. Welds, other than stud welds, are acceptable if inspection indicates conformance within the following limitations:
    a. Undercut shall not be more than 1/32-inch deep.
    b. Convexity or reinforcement of a weld face shall not exceed the limits shown in ANSI/AWS D1.1, Section 3 and there shall be no overlap.
    c. Slag inclusions, porosity and other fusion defects less than 1/16-inch in greatest dimension will be allowed if well dispersed and the sum of the greatest dimensions in any linear inch of welded joint does not exceed 3/8-inch.
    d. Slag inclusions, porosity and other fusion defects 1/16-inch or larger in greatest dimension will be allowed providing such defects do not exceed the limits specified in ANSI/AWS D1.1.
6. When materials or workmanship do not conform to the acceptance requirements, the Engineer reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

J. Corrections and Repairs

1. General: In lieu of rejection of an entire piece or member containing welding which is unsatisfactory or which indicates inferior workmanship, the corrective measures listed hereinafter may be permitted by the Engineer. The Engineer's specific approval must be obtained before making each correction. Corrective measures shall be made at the Contractor's expense and to the satisfaction of the Engineer and/or to the satisfaction of an independent testing lab.
2. Defective or unsound welds or base metal shall be corrected either by removing and replacing the entire welds, or as follows:
    a. Excessive convexity and overlap shall be reduced by removal of excess weld metal.
    b. Any concavity of weld, crater, undersize welds or undercutting shall be corrected by cleaning and depositing additional weld metal.

c. Excessive weld porosity, slag, inclusions or incomplete fusion shall be repaired by removing defective portions and rewelding.

d. Cracks in weld or base metal shall be repaired by removing crack throughout its length, including sound weld metal 2 inches beyond each end of the crack and rewelding.

3. The removal of defective weld metal or portions of the base metal shall be done by chipping, grinding, oxygen cutting, oxygen gouging, or air carbon-arc and in such a manner that the remaining weld metal or base metal is not nicked or undercut. Defective portions of the weld shall be removed without removal of the base metal.

4. Additional weld metal shall be deposited using an electrode smaller than that used for making the original weld, and not more than 5/32-inch diameter. The surface shall be cleaned thoroughly before welding.

5. Caulking of welds shall not be permitted.

6. Improperly fitted parts may be cut apart and rewelded. Members distorted by welding shall be straightened by mechanical means or by carefully supervised application of a limited amount of localized heat.

a. The temperature of heated areas shall not exceed 1,200 degrees Fahrenheit (a dull red color). Temperature shall be carefully measured with temperature indicating crayons during the heating operation.

b. Parts to be heated for straightening shall be substantially free of stress and from external forces, except those stresses resulting from mechanical means used in conjunction with the application of heat.

7. No peening shall be done on the root or surface layers of a weld. Peening of intermediate weld layers may be used only if authorized by the Engineer and directed by him. Care shall be exercised to prevent overpeening which may cause overlapping, scaling, cracking, flaking, or excessive cold working of weld and base metal.

1.06 QUALITY ASSURANCE

A. Welding Procedure Qualifications

1. General: Except for prequalified or previously qualified procedures, the Contractor shall qualify the welding procedure specifications for any welding procedure performed in the fabrication of weldments. Qualifications of welding procedures shall conform to ANSI/AWS D1.1 and ANSI/AWS D1.4.

2. Welding procedure specification and the results of the procedure qualification test for each type of welding, which requires procedure qualifications, shall be submitted for approval. Approval of any procedure, however, will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these

Specifications. This information shall be submitted on the forms in Annex E of ANSI/AWS D1.1.

a. Procedures, when qualified, become the welding procedure specifications and are to be followed in making welds on the subject materials and provide a means of assuring reproducible results and quality control.

b. Separate procedure specifications shall be prepared for each type of weld.

c. Welding procedure specifications shall be individually identified and shall be referenced on the Shop Drawings and erection drawings, or shall be suitably keyed to the Contract Drawings.

3. Previous Qualifications: Welding procedures previously qualified by test may be acceptable for this Contract without requalification if the following conditions are met:

a. Testing was performed by an approved testing laboratory.

b. The qualified welding procedure conforms to the requirements of this Section and is applicable to welding conditions encountered under this Contract.

c. The welder, welding operator and tacker qualification tests conform to the requirements of this Section and are applicable to welding conditions encountered under this Contract.

4. Prequalified Procedures: Welding procedures which are considered prequalified as specified in ANSI/AWS D1.1 and ANSI/AWS D1.4, will be accepted without further qualification.

a. The Contractor shall submit for approval a listing and an annotated drawing to indicate the joints not prequalified.

b. Procedure qualification shall be required for the joints not prequalified.

5. Retests: If welding procedure fails to meet the requirements of ANSI/AWS D1.1 or ANSI/AWS D1.4, the procedure specification shall be revised and requalified.

a. At the Contractor's option, with the Engineer's approval, welding procedure may be retested in accordance with the standards.

b. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.

B. Welder, Welding Operator and Tacker Qualification

1. General Information: Each welder, welding operator and tacker assigned to work on this Contract shall be certified in conformance with ANSI/AWS

D1.1, Section 4. Welders shall also be New York City certified, and all welding shall be done in conformity with the NYCBC.

2. Certificates: Before assigning any welder, welding operator or tacker to work under this Contract, the Contractor shall submit to the Engineer the names of the welders, welding operators and tackers to be employed and certification that each individual is qualified as specified.

   a. The certification shall state the type of welding and positions for which the welder, welding operator or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests.

   b. The certification shall be kept on file at the job Site by the Contractor. The certification shall be kept current for the duration of the Contract.

3. Identification of Welds: The Contractor shall assign each welder, welding operator or tacker an identifying number, letter or symbol which shall be used to identify all welds made by that person. For identification, the welder, welding operator or tacker shall apply the assigned symbol adjacent to the weld by means of a rubber stamp, felt tipped marker with waterproof ink or other methods that do not cause an indentation in the metal. Identification with die stamps or electric etches shall not be allowed.

4. Record of Welds: The Contractor shall maintain a record of all welders, welding operators and tackers employed on the Contract showing the date and results of tests and the identification mark assigned to each person. These records shall be certified by the Contractor and copies of the records shall be furnished to the Engineer.

5. Previous Qualifications: At the discretion of the Engineer, welders, welding operators and tackers qualified by test within the previous 6 months may be accepted for this Contract without requalification if all of the following conditions are met:

   a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the requirements shown on the Contract Drawings.

   b. Testing was performed by an approved testing laboratory.

   c. The previously-qualified welding procedure conforms to the requirements of this Section and is applicable to welding conditions encountered under this Contract.

   d. The welder, welding operator and tacker qualification tests conform to the requirements of this Section and are applicable to welding conditions encountered under this Contract.

6. Renewal of Qualifications: Requalification of a welder or welding operator shall be required under any of the following conditions:

   a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which the welder or welding operator is qualified.

   b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these Specifications.

   c. The welder or welding operator was qualified by an employer other than those firms performing Work under this Contract, and a qualification test has not been taken within the past 12 months. Records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified shall be submitted as evidence of conformance.

   d. A tacker who passes the qualification test shall be considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker shall be required to pass the prescribed tack welding test.

1.07 SUBMITTALS

A. The Contractor shall prepare and submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to, the following:

1. Erection drawings, and catalog data on welding equipment and materials.
2. Welding procedure specifications.
3. Welding procedure qualifications and test records.
4. Welder, welding operator and tacker qualifications and test records.
5. Records of tests and inspections of installed welds.
6. Testing or inspection agency selection.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. All welding equipment, electrodes, welding wire and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures.

B. All welding equipment and materials shall comply with the applicable requirements of ANSI/AWS D1.1 and ANSI/AWS D1.4.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Supervision

1. All shop and field welding shall be under the immediate supervision of a representative of a standard testing agency or an approved inspection agency reporting directly to, and under the control of, the Department of Environmental Protection.

2. Procedures and techniques for inspection shall be in accordance with the applicable requirements of ANSI/AWS D1.1. The Contractor shall submit the name of such agency to the Commissioner for approval before starting Work.

3. The costs of all welding inspections and tests shall be borne by the Contractor.

B. Inspection and Tests

1. The Engineer will make periodic checks of each welder to determine that welds are being made as specified in the approved procedure specifications. Welding speed may be estimated.

2. All welds will receive 100 percent visual inspection to determine weld size and profile, surface cracks, overlap, and undercut.
3. Welds shall receive non-destructive testing as required in Section 05 12 00 - Structural Steel Framing.
4. The Engineer reserves the right to perform any additional test on any weld, including liquid penetrant, magnetic particle, radiographic, and ultrasonic. The costs of such testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the City if the welds are satisfactory.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 05 05 23.02 - MISCELLANEOUS METAL FASTENINGS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all materials, labor, and equipment required to provide all metal fastening in accordance with the Contract Drawings and as specified herein.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	11
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Installation	11
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

1. Section 05 05 13.01 - Galvanizing
2. Section 05 05 23.01 - Welding
3. Section 05 12 00 - Structural Steel Framing

1.04 REFERENCES

A. ASTM International (ASTM)

1. ASTM A 36 - Carbon Structural Steel.
2. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
3. ASTM A 489 - Carbon Steel Lifting Eyes.
4. ASTM A 563 - Carbon and Alloy Steel Nuts.
5. ASTM B 348 - Titanium and Titanium Alloy Bars and Billets.
6. ASTM D 1785 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
7. ASTM E 488 - Standard Testing Method for Strength of Anchors in Concrete Elements
8. ASTM E 1109 - Test Method for Strength of Power-Actuated Fasteners Installed in Structural Members
9. ASTM E 1512 - Test Method for Testing Bond Performance of Bonded Anchors
10. ASTM F 436 - Specification for Hardened Steel Washers Inch and Metric Dimensions
11. ASTM F 467 - Nonferrous Nuts for General Use.
12. ASTM F 593 - Stainless Steel Bolts; Hex Cap Screws, and Studs.
13. ASTM F 594 - Stainless Steel Nuts.
14. ASTM F 1554 - Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Inch and Metric Dimensions
15. ASTM F 3125 - Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated 120 ksi and 150 ksi, Minimum Tensile Strength Inch and Metric Dimensions

B. American Concrete Institute (ACI)

1. ACI 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete
2. ACI 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete

C. International Code Council – Evaluation Service (ICC-ES)

1. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements

2. ICC-ES AC58 - Acceptance Criteria for Adhesive Anchors in Masonry Elements
3. ICC-ES AC60 - Acceptance Criteria for Anchors in Unreinforced Masonry Elements
4. ICC-ES AC70 - Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements
5. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
6. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements
7. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

D. American Welding Society (AWS)

1. AWS D1.1- Structural Welding Code - Steel
2. AWS D1.2- Structural Welding Code - Aluminum
3. AWS D 1.6 - Structural Welding Code – Stainless Steel

E. American Society of Mechanical Engineers (ASME)

1. ASME B 18.2.1 - Square, Hex Bolts, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head and Lag Screws (Inch Series)
2. ASME B 18.2.2 - Square and Hex Nuts (Inch Series)
3. ASME B 18. 22.1 - Plain Washers

F. New York City Building Code (NYCBC)

G. NYC Buildings Bulletin 2009-019

H. American Institute of Steel Construction (AISC)

1. Steel Construction Manual
2. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges
3. AISC 360 - Specification for Structural Steel Buildings
4. RSCS Specification for Structural Joints Using High-Strength Bolts

I. Aluminum Association

1. Specifications for Aluminum Structures

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project. Fasteners to be tested shall be randomly selected by the Engineer in the field.

B. All welding shall be performed by welders certified in accordance with AWS. Certifications of field welders shall be submitted prior to performing any field welds as per Section 05 05 23.01 – Welding. Welding shall comply with, but not limited to the following:

1. AWS D1.1 for Steel
2. AWS D1.2 for Aluminum
3. AWS D1.6 for Stainless Steel.
4. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer, at no additional cost to the City.

C. Fasteners and concrete anchors will be inspected in accordance with the Inspection Article in Part 3.

D. Manufacturer’s load tables and certified performance tests for titanium bolts shall be provided.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for approval by the Engineer. Submittals shall include, but not be limited, to the following:

1. Shop Drawings providing the manufacturer, fastener type, certification of the fastener's material and capacity and product data such as:
   a. Product information
   b. Technical information
   c. Manufacturer’s Installation Instructions (MPII)
   d. ICC-ES Evaluation Report.
2. Copy of valid AWS certification for each person who is to perform field welding.
3. Certified weld inspection reports, when required.
4. Adhesive Anchors
   a. For all adhesive anchors, submit anchor sizes and location plan
   b. Testing methods, procedures and equipment.
   c. In the event that any adhesive anchors fail field testing, submit a detailed procedure for the removal and replacement of those anchors.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials stored outdoors shall be supported above ground surfaces and protected with approved effective and durable covers.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion anchors shall be:

1. Power-Stud+SD1 as manufactured by DeWalt, Brewster, NY;
2. Kwik Bolt 3 (KB3) expansion anchor as manufactured by Hilti, Plano, TX;
3. Strong-Bolt 2 Wedge Anchor as manufactured by Simpson Strong-Tie, Pleasanton, CA;
4. Or approved equal.

B. Screw anchors shall be:

1. Type 316 stainless steel KH-EZ screw anchor as manufactured by Hilti, Plano, TX;
2. Type 316 stainless steel Wedge-Bolt screw anchor as manufactured by DeWalt, Brewster, NY;
3. Type 316 stainless steel Titen-HD screw anchor as manufactured by Simpson Strong-Tie, Pleasanton, CA;
4. Or approved equal.

C. Sleeve or drop-in anchors shall be as manufactured by:

1. Hilti Inc., Plano, TX;
2. DeWalt, Brewster, NY;
3. Simpson Strong-Tie, Pleasanton, CA;
4. Or approved equal.

D. Adhesive Anchors

1. Epoxy adhesive anchor system shall be:
   a. Pure 110+ as manufactured by DeWalt, Brewster, NY;

b. HIT-RE 500-V3 as manufactured by Hilti, Plano, TX;

c. Or approved equal.

2. Vinylester adhesive anchor system shall be:

a. AC200+ as manufactured by DeWalt, Brewster, NY;

b. HIT HY-200 as manufactured by Hilti, Plano, TX;

c. A7+ as manufactured by ITW Ramset/Redhead, Glendale Height, IL;

d. AT-XP as manufactured by Simpson Strong-Tie, Pleasnaton, CA;

e. Or approved equal.

E. The wedge inserts shall be as manufactured by:

a. Hohmann & Barnard, Inc., Hauppauge, NY;

b. Or approved equal.

F. Anchor channel shall be as manufactured by:

a. Halfen Anchoring Systems, Tampa, FL;

b. Or approved equal.

G. Masonry Anchors

1. The adhesive system shall be as manufactured by:

a. Hit HY-70 by Hilti Inc., Plano, TX;

b. AC100+ Gold by DeWalt, Brewster, NY;

c. AT (acrylic) or SET (epoxy) by Simpson Strong-Tie, Pleasanton, CA;

d. Or approved equal.

H. Expansion Bolts in Structural Steel Connections shall be:

1. Type HB Hollo-Bolt as manufactured by Lindapter, Syracuse, NY;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Anchor Bolts

1. Anchor bolts for miscellaneous framing and architectural elements attachments shall conform to ASTM A36 or ASTM A307 Grade A except where stainless steel or other approved anchor bolts are shown on the Contract Drawings. Anchor bolts shall be of the size and configuration shown on the Contract Drawings and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A.

2. Anchor bolts for equipment attachment shall be of stainless steel Type 316 with nitronic 60 stainless steel nuts and locknuts.

3. All underwater anchor bolts shall be Type 316 stainless steel with nitronic 60 stainless steel nuts.

4. Where anchor bolts are used to anchor galvanized steel or are otherwise specified to be galvanized, they shall be hot-dip galvanized in accordance with ASTM A307 and Section 05 05 13.01 - Galvanizing.

5. Pipe sleeves around anchor bolts shall be of the size and configuration shown on the Contract Drawings.

6. Material for anchor bolts submerged in salt water or corrosive liquids for which stainless steel Type 316 is not suitable shall be as indicated in the Contract.

B. Bolts

1. Bolts, nuts and washers for miscellaneous framing and for attachment of architectural elements shall conform to Section 05 12 00 - Structural Steel Framing.

2. Where bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot-dip galvanized in accordance with Section 05 05 13.01 - Galvanizing.

C. Stainless Steel Bolts

1. Stainless steel bolts shall conform to ASTM F593. All underwater fasteners shall be Type 316 stainless steel. Unless otherwise specified, fasteners for aluminum members shall be Type 304 stainless steel. Fasteners for stainless steel members shall be of matching grade.

2. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer, and be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts and shall have a raised letter or symbol indicating the manufacturer.

3. Nuts for stainless steel bolts for elements which are indicated on the Contract Drawings to be removable shall be made of nitronic 60 alloy.

4. Material for bolts submerged in salt water or corrosive liquids for which stainless steel Type 316 is not suitable shall be as indicated in the Contract.

D. Post-Installed Anchors

1. Concrete anchors shall be one of the types listed below as indicated on the Contract Drawings. Unless otherwise noted, all concrete anchors which are submerged, or which are subject to vibration from equipment such as pumps and generators, shall be injected, adhesive anchors. The determination of anchors equivalent to those listed below shall be based on test data performed by a commercial testing laboratory.

a. Mechanical Anchors

1) Expansion anchors shall be wedge, sleeve, or drop-in mechanical anchors.

2) Screw anchors shall be one-piece threaded anchor with a finished hexagonal head.

b. Adhesive anchors shall be two part injection type.

c. Where anchor type is not indicated on the Contract Drawings, the wedge expansion anchor shall be used.

2. Expansion anchors shall be fully threaded, medium duty, Type 316 stainless steel anchors. Shall be sized and embedded to depths as shown on the Contract Drawings. If embedment depth is not given, the standard embedment depth as recommended by the manufacturer shall be used.

a. Manufacturer for Expansion anchor shall be as specified in this Section.

3. Screw anchors shall be a one piece, heavy duty anchor with a finished hexagonal head. Screw anchors shall be sized and embedded to depths as shown on the Contract Drawings. If embedment depth is not given, the standard embedment depth as recommended by the manufacturer shall be used.

a. Manufacturer for screw anchor shall be as specified in this Section.

4. Adhesive anchors shall consist of Grade 60 reinforcing steel ASTM A 615, or Type 316 stainless steel ASTM F593 or Grade B7 high strength carbon ASTM A193 threaded rods or bolts anchored with a two-part injection type adhesive system into hardened concrete or grout-filled masonry. The adhesive system shall use a two-component adhesive mix and shall be injected with a static mixing nozzle following manufacturer's instructions. The anchor diameter, type, and embedment depth shall be as shown on the Contract Drawings.

a. The embedment depth of the rod/bolt shall provide a minimum allowable bond strength that is equal to the allowable tensile capacity of the rod/bolt (see Table 1) unless noted otherwise on the Contract Drawings.

b. Manufacturer for Epoxy adhesive and Vinylester adhesive anchor systems and shall be as specified in this Section.

c. Adhesive anchoring system shall have an ICC-ES Evaluation Service Report issued in accordance with AC308.

d. Adhesive for the anchors must qualify under ACI 355.4.

Table 1
Allowable Tensile Capacity (Kips) for Standard Manufacturer Embedment

Size	Concrete Anchors Wedge Type	Concrete Anchors with Injection Adhesive System
3/8"	1.3	2.1
1/2"	2.4	3.8
5/8"	3.3	5.9
3/4"	4.8	8.4
7/8"	5.6	11.0
1"	7.1	15.0

5. Concrete anchors shall be of Stainless Steel Type 316 unless noted otherwise. Concrete anchors for stainless steel attachments shall be of matching grade.

6. All underwater concrete anchors shall be Type 316 stainless steel and shall have nitronic 60 stainless steel nuts.

7. Material for concrete anchors submerged in salt water or other corrosive liquids for which stainless steel Type 316 is not suitable shall be as indicated in the Contract.

E. Concrete Inserts

1. Wedge Type Inserts:

a. The concrete inserts for attachment of shelf angles or brick relieving angles to the reinforced concrete beams or concrete encased steel beams, shall be wedge type inserts. The inserts shall have an askew head bolt to produce an automatic tightening action when a load is placed on the bolt.

b. The wedge inserts shall be of malleable iron, hot dipped galvanized. The askew bolt and the horseshoe shim plates shall be of stainless steel Type 304 or 316. The type of insert and size of bolts shall be as shown on the Contract Drawings.

c. Manufacturer for wedge inserts shall be as specified in this Section.

2. Anchor Channel Inserts: for the top attachment of the masonry wall panels to steel encased or concrete structures, the inserts shall be:

a. Manufacturer for anchor channel inserts shall be as specified in this Section.

b. The anchor channel shall be made from channel profiles with "I" anchors shop welded to the back of channels. Anchor channels shall be furnished with the head bolts, channel nuts, etc., for a complete installation. All material shall be stainless steel type 304.

c. The type and series of the anchor channel shall be as shown on the Contract Drawings.

d. Anchor channels can be used for other attachments if detailed on the Contract Drawings.

F. Masonry Anchors

1. Masonry anchors shall be injection adhesive anchors with screen tube for fastening to hollow block, clay tiles and brick with holes (see Table 2).

2. Manufacturer for adhesive system shall be as specified in this Section.

3. Masonry anchors shall be of stainless steel type 304 unless noted otherwise. Masonry anchors for stainless steel attachments shall be of the matching grade.

Table 2
Allowable Tensile Masonry (lbs) in Hollow Concrete Block

Size	Masonry Anchors with Injection Adhesive System
1/4"	255
5/16"	370
3/8"	525
1/2"	525

G. Electrodes for Welding

1. Electrodes for welding carbon steel shall comply with Section 05 12 00 - Structural Steel Framing.

2. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.

3. Electrodes for welding stainless steel and other metals shall comply with AWS A5.4.

H. Eye Bolts

1. Eyebolts shall be of the size indicated on the Contract Drawings and shall conform to ASTM A489 unless noted otherwise.

2. Carbon steel eyebolts shall be galvanized in accordance with Section 05 05 13.01 - Galvanizing.

I. Titanium Bolts and Anchors

1. Titanium bolts, washers, nuts and anchors shall be provided in, over, and adjacent to containment areas for ferric chloride and sodium hypochlorite, unless indicated otherwise on the Contract Drawings.

2. Bolts and anchors shall be of the size indicated on the Contract Drawings. Bolts, anchors washers and nuts and shall conform to ASTM B 348, Grade 2.

3. Minimum mechanical and physical properties:

a.	Tensile Strength	50,000 psi
b.	Yield Strength	40,000 psi
c.	Elongation in 4" dia.	20%
d.	Modulus of Elasticity	14.9×10^6 psi

J. Expansion Bolts in Structural Steel Connections

1. Expansion bolts for connecting to hollow section steel or where access is restricted (blind-bolts) shall be Type 316 stainless steel with a hex head such as specified in this Section.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall field verify all dimensions and condition of the materials to be connected, review the Drawings and report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.02 INSTALLATION

A. Anchor Bolts and Concrete Anchors:

1. Anchor bolts shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template.

2. The installation of concrete anchors shall be done in strict conformance with the manufacturer's field demonstration and recommendations.

3. The holes drilled for adhesive anchors shall be cleaned by use of a fiber bristle brush and dry compressed air. The anchors shall be supported in the correct position until the adhesive sets and gains enough strength to prevent any dislocation. Adhesive anchors shall not be tightened or loaded until the adhesive has fully cured as recommended by the manufacturer.
4. No concrete anchor shall be installed before base concrete has attained specified 28-day strength.
5. Concrete anchors shall not be used in place of anchor bolts without Engineer's approval.

B. Bolts:

1. All steel bolts shall be installed in conformance with Section 05 12 00 - Structural Steel Framing.
2. Unless otherwise specified, where aluminum and steel members are connected together they shall be fastened with Type 304 stainless steel bolts and isolated with micarta, nylon, rubber, or approved equal.

C. Concrete Inserts: Provide concrete inserts where shown on the Contract Drawings. Inserts shall be firmly held in position in the forms and sealed from intrusion of concrete mortar during concrete placement.

D. Titanium Bolts

1. All bolts shall be installed in conformance with the manufacturer’s recommendations.
2. Titanium anchors shall be installed in accordance with AISC “Code of Standard Practice” by setting in concrete while it is being placed and positioned by means of a rigidly held plate.

E. Adhesive Anchors

1. Concrete is to be a minimum of 21 days old at time of anchor installation
2. Work shall be performed by certified ACI/CRSI Adhesive Anchor Installers under continuous special inspection
3. Shall be installed in accordance with Manufacturer’s Published Installation Instructions (MPII), the applicable ICC-ES ESR and in accordance with NYC Buildings Bulletin 2009-019
4. Adhesive anchoring installation shall be subject to special inspection requirements of NYCBC section BC 1704.32.
5. Adhesive anchor shall be identified by labels on the packaging including manufacturer’s name, product designation and the requirements specified in ICC-ES AC308, Annex A.

F. Welding

1. Welding shall comply with the requirements of Sections 05 12 00 - Structural Steel Framing and 05 05 23.01 - Welding.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection

1. Inspection for high strength bolted connections shall conform to the requirements of Section 05 12 00 - Structural Steel Framing.
2. At least 25 percent of the concrete anchors required to be installed shall be proof tested to 1.33 times the allowable load specified by the manufacturer of the system.
3. Welding inspection shall be done in accordance with the requirements of Sections 05 12 00 - Structural Steel Framing and 05 05 23.01 - Welding.
4. Inspection of titanium bolted connections shall conform to the requirements of AISC "Code of Standard Practice."
5. Adhesive Anchors: Adhesive anchoring installation shall be subject to special inspection requirements of NYCBC section BC 1704.32.

B. Testing of Adhesive Anchors

1. Field testing:
   a. Testing to be performed by a NYC Buildings Department approved special inspection agency to perform field testing of the installed anchors in accordance with NYCBC BC 1704.32 and ICC-ES ESR and the applicable sections of ASTM E488 in the presence of the Engineer.
   b. Anchors that are to be tested are as indicated on the Contract Drawings.
2. Pull-out testing:
   a. A total of 15% of the adhesive anchors designated for testing are to be tested and no more than one (1) bolt is to be tested per connection.
   b. The Engineer will randomly choose the anchors to be tested.
   c. Testing of the adhesive anchors shall not begin until all the anchors are installed.
   d. If only one anchor fails, all the adhesive anchors will be accepted. If a second anchor fails, an additional 5% of the anchors shall be tested. If more than 20% of the total anchors tested fail, all the anchors shall be removed and replaced.
3. Removal and replacement of failed test anchors:
   a. Remove all anchors that fail the field test without damage to the surrounding concrete.

b. Redrill holes to remove adhesive bonding material residue and clean in accordance with MPII.

c. Reinstall new anchors that are the same size as the removed anchors and install the new anchors in the same exact location as the removed anchor. Do not reuse the failed anchors, they shall be discarded.

d. Assign reinstalled anchors into batches only containing reinstalled anchors of the same diameter, embedment length and adhesive bonding material system, and field test in accordance with the above sections.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 05 06 00.01 - SCHEDULES FOR STAINLESS STEEL WORK
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, install and erect the stainless steel work as specified herein and shown on the Contract Drawings.

B. Stainless steel work shall be furnished complete with all accessories, mountings and appurtenances of the type of stainless steel and finish as specified or required for a satisfactory installation.

The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Implementation	11
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	13
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 63.01 – Sustainability Requirements

B. Section 05 05 23.01 - Welding.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ASTM A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
2. ASTM A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
3. ASTM A262 - Practice for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steel.
4. ASTM A276 - Stainless and Heat-Resisting Steel Bars and Shapes.
5. ASTM A314 - Stainless and Heat-Resisting Steel Billets and Bars for Forging.
6. ASTM A380 - Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.
7. ASTM A473 - Stainless and Heat-Resisting Steel Forgings.
8. ASTM A666 - Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar.
9. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws and Studs.
10. ASTM F594 - Stainless Steel Nuts.
11. ASME B1.1 - Unified Inch Screw Thread (UN and UNR Thread Form).
12. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Tests

1. All stainless steel materials including stainless test welds, shall be checked for compliance with tests for susceptibility to intergranular

attack. Such tests shall be Practices A, B and E of ASTM A262. Detailed procedures for the tests shall be submitted to the Engineer for approval prior to start of work. Practice A shall be used only for acceptance of materials but not for rejection of materials, and shall be used for screening material intended for testing in Practice B and Practice E. The maximum acceptable corrosion rate under Practice B shall be 0.004 inch per month, rounded off to the third decimal place. If the certified mill report indicates that such test has been satisfactory performed, the fabricator may not be required to repeat the test. Material passing Practice E shall be acceptable.

2. Sample selection for the susceptibility to intergranular attack tests shall be as follows:

   a. One (1) sample per each heat treatment lot for plates and forgings;

   b. One (1) sample per each Welding Procedure Qualification regardless of the joint design;

   c. If tests indicate a reduction in corrosion resistance, welding procedure shall be adjusted or heat treatment determined as needed to restore required corrosion resistance;

   d. The samples so chosen shall have received all the post-weld heat treatments identical to the finished part.

1.06 QUALITY ASSURANCE

A. Shop inspections may be made by the City representatives. The Contractor shall give ample notice to the Engineer prior to the beginning of any stainless steel fabrication work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the works.

B. Inspectors shall have the authority to reject any materials or work which does not meet the requirements specified herein or of the Contract Drawings.

C. Inspection at the shop is intended as a means of facilitating the work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship.

1.07 SUBMITTALS

A. The Contractor shall prepare and submit Shop Drawings for all stainless steel fabrication for approval by the Engineer. Submittals shall include, but not be limited to, the following:

1. Certified test reports for susceptibility to intergranular attack.

2. Affidavit of compliance with type of stainless steel shown on the Contract Drawings or specified herein.

3. Certified weld inspection reports.

4. Cleaning and handling of stainless steel in accordance with Article "Cleaning and Handling" in this Section.

B. Samples of finish, on each type of stainless steel to be furnished, shall be submitted in accordance with the Quality Assurance requirements of the Contract.

C. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63.01 – Sustainability Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Mechanical damage (e.g., scratches and gouges) to the stainless steel material can occur during handling. Care shall be taken in the material handling since such mechanical damage will result in the passive oxide film being "punctured" leading to a possible lower resistance to the initiation of corrosion than the surrounding chemically-passivated surface. Corrosion in such areas can be accelerated by the galvanic corrosion effect due to the unfavorable relative area ratios which would exist.

B. Stainless steel plates and sheets shall be stored vertically in racks and not be dragged out of the racks or over one another. Racks shall be protected to prevent iron contamination.

C. Heavy stainless steel plates shall be carefully separated and chocked with wooden blocks so that the forks of a fork-lift could be inserted between plates without mechanically damaging the surface.

D. Stainless steel plates and sheets laid out for use shall be off the floor and be divided by wooden planks to prevent surface damage and to facilitate subsequent handling.

E. Plate clamps, if used, shall be used with care as the serrated faces can dig in, indent and gouge the surface.

F. Stainless steel fabrications shall be loaded in such a manner that they may be transported and unloaded without being overstressed, deformed or otherwise damaged.

G. Stainless steel fabrications and packaged materials shall be protected from corrosion and deterioration and shall be stored in a dry area. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.

H. Stainless steel fabrications shall not be placed in or on a structure in a manner that might cause distortion or damage to the fabrication. The Contractor shall repair or replace damaged stainless steel fabrications or materials as directed by the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Materials and Finishes

1. Type and finish of stainless steel to be utilized for fabrication shall be the type and finish indicated on the Contract Drawings or as specified herein for the intended service and conforming to the applicable ASTM standard.

2. The basic mill forms (sheet, strip, plate and bar) are classified by size as shown on Table 1. Tables 2, 3 and 4 identify finishes and conditions in which sheet, bar and plate are available.

3. Tables 2, 3 and 4 show numbered finishes and conditions for sheet, bar and plate. While there are no specific designations for polished finishes on bar or plate, the sheet finish designations are used to describe the desired effect. This also applies to finishes on ornamental tubing.

4. There are three standard finished for strip, which are broadly described by the finishing operations employed:

   a. No. 1 Strip Finish is approximately the same as No. 2D Sheet Finish. It varies in appearance from dull gray matte to a fairly reflective surface, depending largely on alloy composition and amount of cold reduction.

   b. No. 2 Strip Finish is approximately the same as a No. 2B sheet finish. It is smoother, more reflective than No. 1, and likewise varies with alloy composition.

   c. Bright annealed finish is a highly reflective finish that is retained by final annealing in a controlled atmosphere furnace.

Table 1
Classification of Stainless Steel Product Form

Item	Description	Dimensions		
		Thickness	Width	Diameter or Size
Sheet	Coils and cut length: Mill finishes Nos. 1, 2D and 2B Polished finishes Nos. 3, 4, 6, 7 & 8	 under 3/16" under 3/16"	 24" and over all widths	 -- --
Strip	Cold finished, coils or cut lengths Polished finishes Nos. 3, 4, 6,7 & 8	under 3/16" under 3/16"	under 24" all widths	-- --
Plate	Flat rolled or forged	3/16" and over	over 10"	--
Bar	Hot finished rounds, squares, octagons and hexagons Hot finished flats Cold finished rounds, squares, octagons and hexagons Cold finished flats	-- 1/8" to 8" incl. -- 1/8" to 4-1/2"	-- 1/4" to 10" incl. -- 3/8" to 4-1/2"	1/4" and over -- over 1/8" --
Wire	Cold finishes only: (in coil) Round, square, octagon, hexagon and flat wire	 under 3/16"	 under 3/8"	 --
Pipe and Tubing	Several different classifications, with differing specifications, are available.			
Extrusion	Not considered “standard” shapes. Currently limited in size to approximately 6-1/2" diameter or structurals.			

Table 2

Standard Mechanical Sheet Finishes

Unpolished or Rolled Finishes: No. 1 A rough dull surface which results from hot rolling to the specified thickness followed by annealing and descaling.	No. 4 A polished surface obtained by finishing with a 120-150 mesh abrasive, following initial grinding with coarser abrasives. This is a general purpose bright finish with a visible "grain" which prevents mirror reflection.
No. 2D A dull finish which results from cold rolling followed by annealing and descaling, and may perhaps get a final light roll pass through unpolished rolls. A 2D finish is used where appearance is of no concern.	No. 6 A dull satin finish having lower reflectivity than No. 4 finish. It is produced by Tampico brushing the No. 4 finish in a medium of abrasive and oil. It is used for architectural applications and ornamentation where a high luster is undesirable, and to contrast with brighter finishes.
No. 2B A bright cold-rolled finish resulting in the same manner as No. 2D finish, except that the annealed and descaled sheet receives a final light roll pass through polished rolls. This is the general purpose cold-rolled finish that can be used as is, or as a preliminary step to polishing.	No. 7 A high reflective finish that is obtained by buffing finely ground surfaces but not to the extent of completely removing the "grit" lines. It is used chiefly for architectural and ornamental purposes.
Polished Finishes: No. 3 An intermediate polish surface obtained by finishing with a 100 grit abrasive. Generally used where a semi-finished polished surface is required. A No. 3 finish usually receives additional polishing during fabrication.	No. 8 The most reflective surface, which is obtained by polishing with successively finer abrasives and buffing extensively until all grit lines from preliminary grinding operations are removed. It is used for applications such as mirrors and reflectors.

Table 3
Conditions and Finishes for Bar

Conditions	**Surface Finishes[1]**
Hot worked only	(a) Scale not removed (excluding spot conditioning) (b) Rough turned[2] (c) Pickled or blast cleaned and pickled.
Annealed or otherwise heat treated.	(a) Scale not removed (excluding spot conditioning) (b) Rough turned (c) Pickled or blast cleaned and pickled (d) Cold drawn or cold rolled (e) Centerless ground (f) Polished
Annealed and cold worked to high tensile strength[3]	(d) Cold drawn or cold rolled (e) Centerless ground (f) Polished

Table 4
Conditions and Finishes for Plate

Condition and Finish	**Description and Remarks**
Hot rolled	Scale not removed. Not heat treated. Plates not recommended for final use in this condition.[4]
Hot rolled, annealed or heat treated	Scale not removed. Use of plates in this condition is generally confined to heat resisting applications. Scale impairs corrosion resistance.[1]
Hot rolled, annealed or heat treated, blast cleaned or pickled	Condition and finish commonly preferred for corrosion resisting and most heat resisting applications.
Hot rolled, annealed, descaled and temper passed	Smoother finish for specialized applications.
Hot rolled, annealed, descaled cold rolled, annealed, descaled, optionally temper passed	Smooth finish with greater freedom from surface imperfection than the above.
Hot rolled, annealed or heat treated, surface cleaned and polished	Polished finishes refer to Table 2.
Notes: 1. Surface finishes (b), (e) and (f) are applicable to round bars only.	
2. Bars of the 4xx series stainless steels which are highly hardenable, such as Types 414, 420, 420F, 431, 440A, 440B and 440C, are annealed before rough turning. Other hardenable grades, such as Types 403, 410, 416 and 416Se, may also require annealing depending on their composition and size.	
3. Produced in Types 302, 303Se, 304 and 316.	
4. Surface inspection is not practicable on plates which have not been pickled or otherwise descaled.	

B. Fasteners

1. Stainless steel fasteners shall be used for joining stainless steel work.

2. Stainless steel fasteners shall be made of alloys that are equal to or more corrosion resistant than the materials they join.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Joints exposed to the weather shall be formed to exclude water.

2. As far as practicable, all fabricated units shall be fitted and assembled in the shop, with all cuts and bends made to precision measurements in accordance with details shown on approved shop drawings.

3. Work shall be fabricated so that it is installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, ensure rigidity, and provide close fitting of sections.

4. All finished and/or machined faces shall be true to line and level. Stainless steel sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves.

5. All work shall be fitted together at the shop as far as possible, and delivered complete and ready for erection. Proper care shall be exercised in handling all work so as not to injure the finished surfaces.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the work.

2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

3.02 IMPLEMENTATION

A. Installation

1. All stainless steel fabrications shall be erected square, plumb and true, accurately fitted, adequately anchored in place, set at proper elevations and positions.

2. All inserts, anchor bolts and all other miscellaneous work specified herein or shown on the Contract Drawings or required for the proper completion of the work, which are embedded in concrete, shall be properly set and securely held in position in the forms before the concrete is placed.

3. All stainless steel fabrications shall be installed in conformance with details shown on the Contract Drawings or on the approved shop drawings.

B. Welding

1. Welding shall be done in a manner that will prevent buckling and in accordance with Section 05 05 23.01 - Welding, and as modified hereinafter.

2. All welds exposed in the work shall be ground smooth and finished to match the finish of the adjacent stainless steel surfaces.

3. Select weld rods that provide weld filler metal having corrosion resistant properties as nearly identical or better than the base metal to insure preservation of the corrosion-resistant properties. Provide heat treatment at welds where testing of weld procedure indicates it is required to restore the corrosion resistance.

4. Thermal conductivity of stainless steel is about half that of other steels; and the following methods may be used to accommodate this situation:

   a. Use lower weld current setting.

   b. Use skip-weld techniques to minimize heat concentration.

   c. Use back-up chill bars or other cooling techniques to dissipate heat.

5. Edges of the stainless steel to be welded shall be cleaned of contaminants.

C. Cleaning and Handling

1. All stainless steel surfaces shall be precleaned, descaled, passivated and inspected before, during and after fabrication in accordance with the applicable sections of ASTM A380 and as detailed in the procedures to be submitted to the Engineer for approval prior to start of work. Degreasing and passivation of stainless steel articles shall be conducted as the last step after fabrication.

2. Measures to protect cleaned surfaces shall be taken as soon as final cleaning is completed and shall be maintained during all subsequent handling, storage and shipping.

   a. The Contractor shall submit for approval specific procedures listing all the steps to be followed in detecting contamination and in descaling, cleaning, passivation and protecting of all stainless steel.

   b. Area showing clear indications of contamination shall be recleaned, repassivated and reinspected.

3. At approved stages in the shop operations, contaminants such as scale, embedded iron, rust, dirts, oil, grease and any other foreign matter shall be removed from the metal, as directed or approved by the Engineer. The adequacy of these operations shall be checked by the Engineer. Operations in the shop shall be conducted so as to avoid contamination of the stainless steel and to keep the metal surfaces free from dirt and foreign matter.

4. In order to prevent incipient corrosion during fabrication, special efforts shall be made at all times to keep all stainless steel surfaces from coming in contact with other metals.

   a. Stainless steel and stainless steel welds shall be cleaned with clean sand, stainless steel wool, stainless steel brushes, or other approved means and shall be protected at all times from contamination by any materials, including carbon steel, that shall impair its resistance to corrosion.

   b. Approved methods of cutting grinding and handling shall be used to prevent contamination. If air-arc, or carbon-arc cutting is used, additional metal shall be removed by approved mechanical means so as to provide clean, weldable edges. All grinding of stainless steel shall be performed with aluminum oxide or silicon carbide grinding wheels bonded with resin or rubber. Grinding wheels used on carbon steel shall not be used on stainless steel.

   c. Sand, grinding wheels, brushes and other materials used for cleaning stainless steel shall be checked periodically by the Engineer for contaminants. Cleaning aids found to contain contaminants shall not be used on the work.

D. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all equipment, materials, and services for the fabrication, delivery, unloading, handling, storing, and erection of all structural steel Work as shown on the Contract Drawings and called for herein.

B. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed hereinafter in Article "References" included in this Section to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

C. The following index of this Section is presented for convenience:

D.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	4
1.06	Quality Assurance	4
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Implementation	12
3.03	Field Testing / Quality Control	15
3.04	Startup / Demonstration	15
3.05	Adjusting / Protection / Cleanup	16

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Requirements from the following sections also apply to this Section:

1. Section 05 05 13.01 - Galvanizing
2. Section 05 05 23.01 - Welding
3. Section 09 91 00 - Painting

1.04 REFERENCES

A. Definition:

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards:

1. ASTM:

a. A6 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling

b. A36 - Carbon Structural Steel

c. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

d. A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

e. A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

f. A240 - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications

g. A276 - Stainless Steel Bars and Shapes

h. A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

i. A479 - Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

j. A480 - Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

k. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

l. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

m. A554 - Welded Stainless Steel Mechanical Tubing

n. A563 - Carbon and Alloy Steel Nuts

o. A572 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel

p. A588 - High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4-Inches Thick

q. A848 - Low-Carbon Magnetic Iron

r. A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing

s. F436 - Hardened Steel Washers, Inch and Metric Dimensions

t. F 594 - Stainless Steel Nuts

u. F3125 - High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi & 150 ksi Minimum Tensile Strength, Inch and Metric Dimensions

2. ANSI B18.2.1 - Square and Hex Bolts and Screws-Inch Series.

3. ANSI B18.22.1 - Plain Washers

4. ANSI/ASME B18.2.2 - Square and Hex Nuts (Inch Series)

5. American Welding Society (AWS):

a. A5.1 - Carbon Steel Covered Arc-Welding Electrodes

b. A5.5 - Low-Alloy Steel Covered Arc-Welding Electrodes

c. A5.9 - Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored and Stranded Arc Welding Electrodes and Welding Rods

d. A5.17 - Carbon Steel Electrodes and Fluxes for Submerged-Arc Welding

e. A5.18 - Filler Metals for Gas Shielded Arc Welding, Carbon Steel

f. A5.23 - Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

g. D1.1 - Structural Welding Code

h. QC1 - Qualification and Certification of Welding Inspectors

6. New York City Building Code (NYCBC)

7. New York City Department of Buildings (NYCDOB)

8. American Institute of Steel Construction (AISC):

a. Steel Construction Manual

b. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges

c. AISC 360 - Specification for Structural Steel Buildings

d. RSCS Specifications for Structural Joints Using High-Strength Bolts

e. Design Guide 24 - Hollow Structural Sections

9. Steel Structures Painting Council (SSPC)

10. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Definition

1. Structural Steel: The term structural steel shall be as defined in the Codes of Standard Practice for Steel Buildings and Bridges of the AISC. Included as structural steel shall be all stiffeners, plates, sag rods and other miscellaneous metal required for a complete installation.

1.06 QUALITY ASSURANCE

A. All fabrication and erection shall be performed by AISC Quality Certified Companies.

B. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.
2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.
3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.
4. Quality Assurance inspections shall include (but are not limited to) the following activities:
    a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.
    b. Perform visual inspection of welding, as per applicable welding code.
    c. Perform visual and dimensional inspection of completed work.All welding shall be performed by certified welders under the immediate supervision of a representative of a standard testing agency or a special inspection agency reporting directly to and under the control of the City and meeting the requirements of Section 05 05 23.01 – Welding.

C. The Contractor shall submit the name of such testing agency to the Commissioner for approval before starting Work.

1. All shop and field welds in structural steel shall be visually inspected by an AWS qualified welding inspector. The Contractor shall furnish a letter of certification for each welded connection stating that these requirements have been met.
2. The costs of all welding supervision and inspections shall be borne by the Contractor. The Contractor shall engage inspectors to inspect welded connections and to perform tests and prepare test reports.
3. Nondestructive testing such as radiographic testing or ultrasonic testing, when required, shall be as specified by the Engineer and performed in accordance with the applicable AWS or ASME code. Frequency of such testing shall also be as specified by the Engineer and indicated on the Contract Drawings.
4. Welds that are required by the Engineer and/or inspectors to be corrected shall be corrected or redone and retested as directed, at the Contractor's expense and to the satisfaction of the Engineer and/or an acceptable independent testing lab.

D. The Contractor shall engage an independent testing and inspection agency to inspect high-strength bolted connections. The agency shall report directly and be under the control of the City. The costs of all high-strength bolt inspections shall be borne by the Contractor.

1. Rejected bolts shall be either replaced or retightened as required. In cases of disputed bolt installation, the bolts in question shall be checked by a calibrated wrench certified by an independent testing laboratory. The certification shall be at the Contractor's expense.

E. The Contractor shall be solely responsible for the correctness of all shop and field fabrication and fit.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Layout drawings indicating all materials, structural shapes, sizes, and dimensions.
2. Beam and column schedules.
3. Detail drawings indicating connection and anchoring details.
4. Anchor bolts and setting plans.
5. Erection drawings

B. No fabrication shall be started until Shop Drawings have been approved in writing by the Engineer.

C. The Contractor shall also submit the following:

1. Certified mill test reports
2. Affidavit of compliance with grade specified
3. Certified weld inspection reports
4. Certification for bolts
5. Paint certification
6. Quality certifications for fabricators and erectors.

D. The Contractor shall furnish samples for testing, if required by the Contract.

E. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Structural members shall be loaded in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

B. Structural steel members and packaged materials shall be protected from corrosion and deterioration. Material shall be stored in a dry area.

C. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.

D. Materials shall not be placed on the structure in a manner that might cause distortion or damage to the members or the supporting structures. The Contractor shall repair or replace damaged materials or structures as directed by the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Structural Steel

1. The fabricator shall provide an affidavit stating that the structural steel furnished meets the requirements of the grade specified. All unidentified steel will be rejected and shall be removed from the site and replaced by the Contractor, at no additional cost to the City.

2. Structural steel for W shapes shall conform to ASTM A992 unless otherwise indicated.

3. Structural steel for S, M, and HP shapes and channels shall conform to ASTM A572 Grade 50 unless otherwise indicated.

4. Structural steel for angles and plates shall conform to ASTM A36 unless otherwise indicated.

5. Certified mill test reports or certified reports of tests made by the fabricator or a testing laboratory for structural steel in accordance with ASTM A6 and the governing specification shall constitute evidence of conformity with the ASTM Specification.

6. Steel pipe shall be ASTM A53, Type E or S, Grade B.

7. Structural tubing shall be ASTM A500, Grade B. All members shall be furnished full length without splices unless otherwise noted or accepted by the Engineer.

8. Low alloy, high strength, high corrosion resistant steel shall conform to ASTM A 588.

9. High strength Columbium-Vanadium structural steel shall conform to ASTM A 572, Grade 50.

B. Stainless Steel Plate, Sheet and Strip:

1. Stainless steel plate, sheet, and strip shall conform to ASTM A240, Type 316L, of thickness as indicated on the Drawings and shall be furnished hot-rolled, annealed and pickled with the following finishes. Minimum yield strength shall be 28 ksi. Material shall be marked in accordance with ASTM A480.

   a. Provide No. 1 plate finish for non-architectural applications.

   b. Provide polished finish No. 4 for architectural applications.

   c. Provide brushed stain finish No. 6 for architectural applications.

2. Stainless Steel bars and shapes shall conform to ASTM A276 or A479 or A484, Type 316L, of designation indicated on Contract Drawings and shall

be hot rolled or extruded, cold finish, annealed and descaled. Minimum yield strength shall be 28 ksi.

a. Provide No. 1 plate finish for non-architectural applications.

3. Stainless steel pipe tubing shall conform to ASTM A554, Type 316L of designation indicated on the Drawings. Minimum yield strength shall be 28 ksi.

a. Provide No. 1 plate finish for non-architectural applications.

b. Provide polished finish No. 4 for architectural applications.

c. Provide brushed stain finish No. 6 for architectural applications.

C. Bolts

1. High strength bolts shall conform to ASTM F3125. Other bolts shall conform to ASTM A307. Unless otherwise indicated, all bolts shall be ASTM F3125.

2. Galvanized high strength bolts shall conform to ASTM F3125, Type 1, nuts shall conform to ASTM A563. Galvanizing shall be by the hot-dip process and in accordance with Section 05 05 13.01 - Galvanizing.

a. Nuts shall meet the requirements of either ASTM A563 for Grade DH, or ASTM A194 for Grade 2H.

b. Flat circular washers and square or rectangular beveled washers shall conform to the requirements of ASTM F436.

c. Bolt dimensions shall conform to the requirements for regular semi-finished hexagon bolts, ANSI B18.2.1., unless otherwise specified.

d. Nut dimensions shall conform to requirements for heavy hexagon semi-finished nuts ANSI/ASME B18.2.2. Washers shall be flat and smooth and their dimensions shall conform to the requirements for heavy plain washers, ANSI B18.22.1.

3. Bolts used to connect dissimilar metals or located in a corrosive atmosphere, as indicated on the Contract Drawings or specified herein, shall be Type 316 stainless steel conforming to ASTM A193 and A194.

4. Bolts not manufactured in the United States shall be tested and certification provided with respect to specified and required quality and strength standards. Certification of origin shall be provided for all United States fasteners. Bolts to be tested will be randomly selected in the field by the Engineer.

D. Anchor Bolts

1. Anchor bolts for structural steel shall be of the size and configuration shown on the Contract Drawings and shall conform to ASTM A307 unless shown or noted otherwise on the Contract Drawings.

E. Welding Electrodes

1. Welding electrodes for manual shielded metal arc welding shall conform to ANSI/AWS A5.1. Carbon steel electrodes and granular flux for the submerged-arc welding process shall conform to ANSI/AWS A5.17 and low-alloy steel electrodes and fluxes for submerged arc-welding shall conform to ANSI/AWS A5.23 as required for the conditions of actual use.

2. Welding electrodes for ASTM A36 steel shall comply with ANSI/AWS A5.1 (minimum tensile strength of 72,000 psi) and shall be E70XX.

3. Welding electrodes for ASTM A588, ASTM A572, and ASTM A992 steel shall comply with ANSI/AWS A5.17 (tensile strength range of 70,000 psi to 95,000 psi) or ANSI/AWS A5.23 wire and flux, and shall be F7XX-EXXX or F7XX-EXX-XX.

4. Gas-welding electrodes for steel shall comply with ANSI/AWS A5.18 (minimum yield strength of 60,000 psi).

F. Shear Studs: Stainless steel conforming to ASTM A276, similar to Nelson Stud Welding System, or equal.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication shall be in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges.

B. Anchor Bolts:

1. All anchor bolts for structural steel erection and other incidental items of the structural steel required to be built into concrete shall be properly set and securely held in position in the forms before the concrete is placed.

2. Anchor bolts and setting plans for steel columns shall be provided at the site, marked or tagged for ready identification.

3. Anchor bolts shall be accurately set to template and at elevation to provide suitable projection above concrete and/or grout as specified in AISC Code of Practice. Anchor bolts shall be set perpendicular to the theoretical bearing surface.

4. All holes in structural steel members required for anchors, anchor bolts, bolt holes, connection angles, supports and braces for stair stringers, equipment

apparatus, sag rods, or other members noted on the Contract Drawings shall be provided by the fabricator and detailed on the shop drawings.

5. Where misalignment between anchor bolts and bolt holes in steel members is encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misalignment for review by the Engineer.

C. All materials shall be properly worked and match-marked for field assembly. Where finishing is required, assembly shall be completed including bolting and welding of units before start of finishing operations.

D. Connections:

1. Unless noted otherwise on the Contract Drawings, all beam connections shall be designed for reaction values indicated on the Contract Drawings. Wherever beam reaction values or connection details are not shown, the connection shall be designed to support half the total uniform load capacity tabulated in the AISC tables for allowable loads for laterally supported beams for the given shape, span, and steel specified for the beam in question.

2. Unless noted otherwise on the Contract Drawings, all beam connections designed by the fabricator shall conform to tables for Framed Beam Connections in AISC Manual of Steel Construction.

3. Except where otherwise noted on the Contract Drawings or in this Specification, all shop connections shall be welded.

E. Where shop assembly of field connections is shown, specified or required, the unmatched holes shall be reamed and the pieces matchmarked before disassembly. The interchange of matching parts will not be permitted.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurement

1. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the work.

2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

3.02 IMPLEMENTATION

A. Erection

1. The erection of all structural steel shall conform to the applicable requirements of the Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the AISC.

   a. All temporary bracing, guys and bolts as may be necessary to ensure the safety of the structure until the permanent connections have been made shall be provided by the Contractor.

   b. High strength steel bolts shall conform to the AISC Specifications for Structural Joints Using High-Strength Bolts.

2. All field connections shall be accurately fitted up before being bolted. Drifting shall be only such as will bring the parts into position and shall not be sufficient to enlarge the holes or to distort the metal. All unfair holes shall be drilled or reamed.

3. High Strength Steel Bolts

   a. The furnishing and installation of high-strength bolts, washers and nuts shall be in conformity with:

      1) Relevant sections of the NYCBC.

      2) Latest issue of Rules Relating to High-Strength Bolts by the NYCDOB.

   b. All bolted connections shall use high strength bolts in bearing-type connections according to the AISC Specification for Structural Joints Using High-Strength Bolts.

   c. Where indicated, high strength bolts in slip-critical connections shall be used according to AISC Specification for Structural Joints Using High-Strength Bolts. The Engineer shall approve the procedure for calibration of wrenches and installation of bolts and, in general, shall satisfy himself that all requirements of the Specifications for Structural Joints Using High-Strength Bolts are met.

4. Cutting and Burning: The use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Its use may be permitted on minor members if the

member is not under stress, and only after the written approval of the Engineer has been obtained.

a. No cutting of structural steel members in the field will be allowed except by written approval of the Engineer.

b. All cutting shall be done with an oxyacetylene torch in conformity with the NYCBC and AWS.

5. Grouting of Base Plates and Bearing Plates: All loose column base plates and billets shall be accurately set to the designated levels on steel wedges or angle screeds in preparation for grouting under this Section. Leveling plates grouted in place shall be installed under all structural steel columns.

a. Prior to the placement of non-shrink grout beneath base and bearing plates, the bottom surface of the plates shall be cleaned of all foreign materials, and concrete and masonry bearing surface shall also be cleaned of all foreign materials and roughened to improve bonding.

b. Anchor bolts shall be tightened after the supported members have been positioned and plumbed and the non-shrink grout has attained its specified strength.

c. Baseplates shall be grouted with non-shrink grout to assure full uniform bearing. Grouting shall be done prior to placing loads on the structure.

6. Welding:

a. Welding, where required, shall be performed in accordance with the requirements of:

1) Section 05 05 23.01 – Welding.

2) AWS D1.1 Structural Welding Code.

3) Relevant sections of the NYCBC when applicable.

b. In assembly and during welding the component parts of built-up Work shall be held in place by sufficient clamps, temporary bolts or other adequate means to keep parts in proper position. Where temporary bolts are used, to hold the parts together in steel plates or similar work, the temporary bolts shall be removed and the holes shall be filled with welding material where practical. Otherwise, the nuts shall be tightened and the bolt threads outside the unit shall be burned and the bolt peened to prevent the nut from loosening.

7. Misfits at Bolted Connections:

a. Where misfits in erection bolting are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misfit for review by the Engineer. The Engineer will determine whether the remedy is acceptable or if the member must be refabricated.

b. Incorrectly sized or misaligned holes in members shall not be enlarged by burning or by the use of drift pins. The Contractor shall notify the Engineer immediately and shall submit a proposed method of remedy for review by the Engineer.

B. Frame Assembly

1. Structural frames shall be set accurately to the lines and elevations indicated on the Contract Drawings. The various members shall be aligned and adjusted to form a part of a complete frame or structure before being permanently fastened. Bearing surfaces and other surfaces which will be in permanent contact shall be cleaned before assembly. Necessary adjustments to compensate for discrepancies in elevations and alignments shall be performed.

2. Individual members of the structure shall be leveled and plumbed within AISC tolerances. The Contractor shall provide and install all temporary bracing required until structure is complete.

C. Painting

1. General Requirements:

a. Structural steel work shall be painted in accordance with Section 09 91 00 - Painting. All painting performed at the fabricator's shop shall be subject to inspection by the Engineer, and all parts of the work shall be made accessible to the Engineer.

1) All structural steel shall be given one prime coat before shipment to the field.

2) Structural steel encased in concrete shall not be painted.

3) Structural steel encased in masonry or which will be otherwise inaccessible in the finished work, shall receive two shop coats. After erection and before the steel is enclosed, all damaged surfaces shall be prepared and touched-up.

4) No paint shall be permitted on faying surfaces of slip critical joints unless it is qualified by test in accordance with AISC "Test Methods to Determine the Slip Coefficient for

Coatings used in Bolted Joints" as adopted by the Research Council on Structural connections. Manufacturer's certification shall include a certified copy of the test report.

5) Prime coat shall be compatible with fireproofing system.

b. All structural steel work specified to be painted shall be sand blasted or wheel abraded by the fabricator, of loose mill scale, loose rust, weld slag or flux deposit, dirt and other foreign matter to satisfy the following specifications of the SSPC:

1) SSPC SP-6, Commercial Blast Cleaning, for all steel except steel subject to immersion.

2) SSPC SP-10, Near-White Blast Cleaning, for steels subject to immersion.

c. Cleaned steels shall be primed within 6 hours after cleaning to prevent formation of new rust.

2. Finished Surfaces: Machine finished surfaces with zero clearance metal to metal contact shall be protected against corrosion by rust-inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

3. Field Welds: Surfaces within 2 inches of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes while welding is being done.

4. Defective Work: The Contractor shall correct such work as found to be defective under this Article of the Sections.

D. Galvanizing

1. All steel noted to be galvanized on the Contract Drawings or specified herein shall be galvanized in accordance with Section 05 05 13.01 - Galvanizing.

2. All bolts and anchor bolts connecting galvanized steel members shall be galvanized.

3. Shop paint primer shall be omitted from steel to be galvanized.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, materials and equipment required to fabricate and install all metal fabrications not specifically included in other Sections and required for the completion of the Work as shown on the Contract Drawings and as specified herein.

B. Metal fabrications shall be provided complete with all accessories, base attachments, fastenings and other appurtenances as specified and as may be required for a satisfactory installation.

C. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed hereinafter in Article 1.04 to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Implementation	8
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	9
3.05	Adjusting / Protection / Cleanup	9

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A.	Section 05 06 00.01	-	Schedules for Stainless Steel Work
B.	Section 05 05 13.01	-	Galvanizing
C.	Section 05 05 23.01	-	Welding
D.	Section 05 05 23.02	-	Miscellaneous Metal Fastenings
E.	Section 05 12 00	-	Structural Steel Framing
F.	Section 05 52 13.07	-	Aluminum Pipe Railings
G.	Section 05 53 01.02	-	Stainless Steel Floor Gratings
H.	Section 05 59 16	-	Fabricated Metal Access Hatches
I.	Section 09 91 00	-	Painting

1.04 REFERENCES

A.	ASTM A36	-	Structural Steel.
B.	ASTM A48	-	Gray Iron Castings.
C.	ASTM A276	-	Stainless and Heat-Resisting Steel Bars and Shapes.
D.	ASTM A480	-	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plates, Sheet and Strips.
E.	ASTM A666	-	Austenitic Stainless Steel, Sheet, Strip Plate and Flat Bar.
F.	ASTM B209	-	Aluminum and Aluminum-Alloy Sheet and Plate.
G.	ASTM B221	-	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
H.	ASTM B308	-	Aluminum-Alloy 6061-T6 Standard Structural Profiles.
I.	ASTM B632	-	Aluminum-Alloy Rolled Tread Plate.

J. ANSI/ASSP Z359.16-2016 – Safety Requirements for Climbing Ladder Fall Arrest Systems

K.	ANSI/AWS D1.1	-	Structural Welding Code.
L.	ANSI/AWS D1.2	-	Structural Welding Code - Aluminum.

M. New York City Building Code (NYCBC).

N. American Institute of Steel Construction (AISC).

O. AISC Manual of Steel Construction.

P. AISC Specification for Design and Fabrication of Structural Steel for Buildings Including the Commentary.

Q. Aluminum Association Specifications for Aluminum Constructions.

R. Aluminum Company of America, "Welding and Brazing Aluminum".

S. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual inspection of welding, as per applicable welding code if applicable.

c. Perform visual and dimensional inspection of completed work.

B. Inspectors shall have the authority to reject any materials or Work which does not meet the requirements of these Specifications.

C. Inspection at the shop is intended as a means of facilitating the Work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship under this Section.

D. Design of Members and Connections:

1. All details shown are typical; similar details shall apply to similar conditions, unless otherwise shown or specified. Dimensions shall be verified at the Site without causing delay in the Work.

2. Each fabricator shall be responsible for the structural design of miscellaneous metal work within the requirements established by these Specifications.

E. Complete design calculation and Shop Drawings shall be prepared, signed and stamped with the seal of a Professional Engineer, licensed to practice in the State

of New York with a minimum of 10 years of experience and recognized as an expert in the required work unless the design and details have been shown on the Contract Drawings.

F. "Pencil-line" thin butt joints shall be provided.

G. Shop Assembly: Items in the shop shall be preassembled to the greatest extent possible, so as to minimize field splicing and assembly of units at the Site. Units shall be disassembled only to the extent necessary for shipping and handling limitations. Units shall be clearly marked for reassembly and coordinated installation.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other materials for the approval by the Engineer. Shop Drawings shall include, but not be limited to, the following:

1. Layout drawings shall indicate all structural shapes, sizes and dimensions.
2. Certifications, schedules, design calculations, detailed drawings, plans, elevations, and details of sections and connections
3. Detail drawings shall indicate jointing and anchoring details.
4. Anchor bolts and setting plans
5. Erection drawings

B. No fabrication shall be started until Shop Drawings have been approved by the Engineer.

C. The following shall also be submitted:

1. Manufacturer’s specifications, load table, installation instructions, setting drawings and templates for location and installation of miscellaneous metal items, appurtenances and anchorage devices.
2. Certified weld inspection reports.

D. Representative samples of bolts, anchors and inserts shall be submitted as requested by the Engineer. The Engineer's review shall be for type and finish only. Compliance with all other requirements shall be the exclusive responsibility of the Contractor.

E. Record Drawings: During progress of the Work, an up to date set of drawings showing field and Shop Drawing modifications shall be kept. Immediately upon completion of Work, Record Drawings showing the actual in-place installation of all Work constructed and/or installed under this Section shall be submitted to the Engineer. Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for complete Record Drawings of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Metal fabrications shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

B. Metal fabrications and packaged materials shall be protected from corrosion and deterioration and shall be stored in a dry area. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable covers approved by the Engineer.

C. Metal fabrications shall not be placed in or on a structure in a manner that might cause distortion or damage to the fabrication. The Contractor shall repair or replace damaged metal fabrications or materials as directed by the Engineer.

D. Materials shall be delivered to the Site at such intervals to insure uninterrupted progress of the Work. Anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry shall be delivered, in ample time not to delay that Work.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Vertical Ladders shall be as manufactured by:

1. O'Keeffe's Inc, Merced, CA.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Materials

1. Structural steel shapes shall be fabricated in accordance with the details shown on the Contract Drawings and shall conform to the requirements of Section 05 12 00 - Structural Steel Framing and ASTM A36 unless otherwise indicated. All steel shall be galvanized in accordance with the requirements of Section 05 05 13.01 - Galvanizing, and shop painted in accordance with Section 09 91 00 - Painting.

2. Aluminum shapes and plate shall be 6061-T6 aluminum alloy with mill finishes, and shall be fabricated into finished products with welded or bolted connections as detailed on the Contract Drawings. Extruded shapes shall conform to the requirements of ASTM B221 and ASTM B308; plate and sheets shall conform to ASTM B209. Checkered aluminum plate shall be 6061-T6 aluminum alloy conforming to ASTM B632. Thickness of checkered aluminum plate shall be as shown on the Contract Drawings.

3. Stainless steel shapes and plate shall be Type 316 stainless steel for bolted constructions and 316L for welded construction as detailed on the Contract Drawings and conforming to the applicable requirements of Section 05 06 00.01 - Schedules for Stainless Steel Work. Shapes shall conform to ASTM

A276. Stainless steel plates shall conform to ASTM A480 and ASTM A666.

4. Bolting hardware shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

5. Concrete anchors shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

B. Floor Access Hatches

1. As specified in Section 05 59 16 – Fabricated Metal Access Hatches.

C. Galvanized Accessories

1. Galvanized lintel and shelf angles, angle door guards, floor curb, sill angles and guard posts (bollards), and brackets shall be fabricated from structural steel. Work shall conform to the details on the Contract Drawings and approved shop drawings. Where the material for lintels and shelf angles is not shown on the Contract Drawings, they shall conform to the requirements for "Stainless Steel Lintels and Shelf Angles" as specified herein.

2. Materials and fabrication shall conform to Section 05 12 00 - Structural Steel Framing and ASTM A36. All galvanizing shall be done after fabrication and shall conform to the requirements of Section 05 05 13.01 - Galvanizing.

D. Stainless Steel Lintels and Shelf Angles

1. Lintels and shelf angles shall be bent or rolled angles, fabricated of stainless steel Type 316. All angles shall conform to the sizes, shapes, dimensions and details as noted on the Contract Drawings. The lintels assembled by welding shall be fabricated of stainless steel Type 316L.

2. All mounting and assembly hardware shall be Type 316 stainless steel.

E. Anchor Bolts

1. Anchor bolts shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

F. Vertical Ladders

1. Aluminum ladders shall be fabricated from aluminum 6061-T6 as detailed on the Contract Drawings.

2. Wall mounted ladders shall have welded brackets attached to the wall with concrete or masonry anchors.

3. Ladders shall comply with OSHA 1910.23.

4. Telescoping tubular safety post extending 42 inches above adjacent surface shall be provided with each ladder.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication of steel and stainless steel shall be in accordance with the Specification for the Design Fabrication and Erection of Structural Steel for Building of the AISC. Fabrication of aluminum shall be in accordance with the Aluminum Association Specifications for Aluminum Structures.

B. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Joints exposed to the weather shall be formed to exclude water.

C. As far as practicable, all fabricated units shall be fitted and assembled in the shop, with all cuts and bends made to precision measurements in accordance with details shown on approved Shop Drawings.

D. Work shall be fabricated so that it is installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, ensure rigidity, and provide close fitting of sections.

E. Welding of carbon and low alloy steel shall conform to the applicable requirements of ANSI/AWS D1.1, and Section 05 05 23.01 - Welding. Welding of aluminum shall conform to the applicable recommendations of the Aluminum Company of America publication, "Welding and Brazing Aluminum"; ANSI/AWS D1.2 and Aluminum Association Specification for Aluminum Constructions. Welding shall be done in a manner that will prevent permanent buckling and all welds exposed in the finished Work shall be ground smooth.

F. All finished and/or machined faces shall be true to line and level. Steel and aluminum shall be standard, and well finished. Sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves.

G. All Work shall be fitted together at the shop as far as possible, and delivered complete and ready for erection. Proper care shall be exercised in handling all Work so as not to damage the finished surfaces.

H. Anodized Clear Finish: Exposed aluminum members factory finished free of scratches and other surface blemishes and given a caustic etch and clear anodic coating conforming to The Aluminum Association AA-M10C22A41.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the Work.

2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

B. Inspection

1. The Contractor shall examine the alignment of the substrate and conditions under which metal fabrication Work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the metal fabrication and installation Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.02 IMPLEMENTATION

A. Installation

1. All metal fabrications shall be erected square, plumb and true, accurately fitted, adequately anchored in place, set at proper elevations and positions.

2. All inserts, anchor bolts and all other miscellaneous metal work specified herein or shown on the Contract Drawings or required for the proper completion of the Work, which are embedded in concrete, shall be properly set and securely held in position in the forms before the concrete is placed.

3. All miscellaneous metal fabrications shall be installed in conformance with details shown on the Contract Drawings or on the approved Shop Drawings.

B. Galvanizing

1. All miscellaneous steel fabrications shall be galvanized after fabrication in accordance with Section 05 05 13.01 - Galvanizing.

2. Galvanized surfaces damaged during installation shall be touched up with a galvanizing repair paint applied in accordance with the manufacturer's instructions.

C. Painting

1. All miscellaneous metal fabrications other than aluminum or stainless steel, shall be painted in accordance with the requirements of Section 09 91 00 - Painting.

2. All galvanized metal fabrications, that have the surfaces exposed in the finish work, shall be painted in accordance with Section 09 91 00 - Painting.

3. Aluminum surfaces in contact with concrete or dissimilar metals shall be thoroughly protected with two coats of an epoxy paint with a total thickness of 16 mils or other approved isolating material.

4. Surface preparation shall be done in accordance with Section 09 91 00 - Painting.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for aluminum pipe railing systems. Aluminum pipe railing and auxiliary system components shall conform to the requirements specified herein and in the Contract, and shall be located and configured as shown on the Contract Drawings. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install all aluminum pipe railing.

B. Unless otherwise shown or specified, aluminum pipe railing shall consist of a system of two rails with totally concealed mechanical fasteners, internally threaded tubular rivets and adhesively bonded components fastened to posts spaced not more than 5 feet 0 inches on center and a system of handrails supported from adjacent construction by mounting brackets spaced at not more than 5 feet 0 inches on center.

1. All aluminum pipe railing system components shall be provided with an anodized finish after fabrication, as specified herein.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	7
1.08	Delivery, Storage, and Handling	9
1.09	Spare Parts, Special Tools, and Supplies	10
1.10	Warranty	10
PART 2	PRODUCTS	10
2.01	Manufacturers	10
2.02	Materials / Equipment	11
2.03	Fabrication / Assembling / Finishes	12
2.04	Source Quality Control / Shop Tests	15
PART 3	EXECUTION	15
3.01	Examination / Preparation	15
3.02	Installation	16
3.03	Field Testing / Quality Control	18
3.04	Startup / Demonstration	18
3.05	Adjusting / Protection / Cleanup	18

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. Section 05 05 23.02 - Miscellaneous Metal Fastenings

1.04 REFERENCES

A. NYCBC - New York City Building Code

B. ASTM B26 - Aluminum and Aluminum-Alloy Sand Castings, Standard Specification for

C. ASTM B117 - Operating Salt Spray (Fog) Apparatus, Standard Practice for

D. ASTM B136 - Stain Resistance of Anodic Coatings on Aluminum, Standard Method for Measurement of

E. ASTM B137 - Coating Mass per Unit Area of Anodically Coated Aluminum, Standard Test Method for Measurement of

F. ASTM B210 - Aluminum and Aluminum-Alloy Drawn Seamless Tubes, Standard Specification for

G. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes, Standard Specification for

H. ASTM B241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube, Standard Specification for

I. ASTM B244 - Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments, Standard Test Method for Measurement of

J. ASTM B247 - Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings, Standard Specification for

K. ASTM B429 - Aluminum-Alloy Extruded Structural Pipe and Tube, Standard Specification for

L. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Non-shrink), Standard Specification for

M. ASTM E329 - Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction, Standard Specification for

N. ASTM E488 - Strength of Anchors in Concrete and Masonry Elements, Standard Test Method for

O. ASTM E548 - General Criteria Used for Evaluating Laboratory Competence, Standard Guide for

P. ASTM E894 - Anchorage of Permanent Metal Railing Systems and Rails for Buildings, Standard Test Method for

Q. ASTM E935 - Performance of Permanent Metal Railing Systems and Rails for Buildings, Standard Test Methods for

R. ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings, Standard Specification for

S. ANSI A1264.1 - Safety Requirements for Workplace Floor and Wall Openings, Stairs and Railing Systems

T. AA-ASD - The Aluminum Association, Aluminum Standards and Data

U. AA-SAAA - The Aluminum Association, Standards for Anodized Architectural Aluminum

V. AA- DAF-45 - The Aluminum Association, Designation System For Aluminum Finishes

W. AMP 521/NAAMM - Architectural Metal Products Division of the National Association of Architectural Metal Manufacturers - Pipe Railing Manual

X. AMP 500/NAAMM - Architectural Metal Products Division of the National Association of Architectural Metal Manufacturers, Finishes for Aluminum

Y. 29 CFR 1910.23 - Guarding Floor and Wall Openings and Holes

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer’s facility.

2. Quality Assurance Inspections shall be in accordance with the requirements of the Contract Documents.

3. Shop inspection shall be made by NYCDEP representatives. Inspection instructions shall be issued to the Shop upon receiving the purchase order copy and approved shop drawings from the Contractor through ePMIS. Inspections consist of monitoring work progress, verifying details, and other inspections.

4. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that QA inspection may be made.

5. QA inspections shall include (but no be limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer's Certificates of Conformance

b. Perform visual and dimensional inspection of completed work.

c. Provide a Manufacturer's Certificate of Conformance (CoC) reading "All components and materials used in their manufacture are in accord with the contract, approved shop drawings, and applicable standards. Material traceability was maintained, and items were manufactured in accord with established quality control procedures. All tests specified in shop drawings, contract, and applicable standards were performed and all requirements met." The CoC shall be signed by the company representative responsible for meeting QA quality standards. The CoC shall be submitted to and accepted by NYC QA prior to equipment shipping.

B. Manufacturer Qualifications:

1. Engage a single fabricator, with undivided responsibility for detailing and performance of the aluminum pipe railing systems.

2. Engage a firm which can show minimum of five years previous successful experience in detailing and fabrication of aluminum pipe railing systems of scope and type similar to the required work.

3. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency in compliance with ASTM E329 and ASTM E548. Such inspections and tests shall not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

C. Installer Qualifications:

1. Engage a single installer skilled, trained and with successful and documented experience in the installation of aluminum pipe railing systems and with specific skill and successful experience in the erection of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owner, architects or engineers responsible for projects.

b. Approximate contract cost of the aluminum pipe railing.

c. Amount of area installed.

D. Professional Engineer:

1. Engage a registered professional engineer legally qualified to practice in the State of New York and experienced in providing engineering services of the kind indicated.

2. Responsibilities include, but are not necessarily limited to, the following:

a. Carefully reviewing system performance and design criteria stated in the Contract Documents.

b. Preparing written requests for clarification or interpretation of performance or design criteria for submittal to Engineer by Contractor.

c. Preparing, or supervising the preparation of design calculations, and reviewing and approving related Shop Drawings prepared by the aluminum pipe railing system manufacturer prior to submission to Engineer; testing plan development, and test-result interpretations; and providing comprehensive engineering analyses verifying compliance of the system with the requirements of the Contract Documents.

d. Signing and sealing all calculations and engineering analyses.

e. Certifying that:

1) It has performed the design of the aluminum pipe railing system in accordance with the performance and design criteria stated in the Contract Documents, and

2) The said design conforms to all applicable local, state and federal codes, rules and regulations and to the prevailing standards of practice.

E. Testing Agency Qualifications: To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work in accordance with ASTM E329 and ASTM E548.

F. Performance Criteria:

1. Maintain the visual design concept shown, and the technical requirements specified, including modules, profiles, alignment of components and requirements for finish.

2. Contractor shall provide aluminum pipe handrail and railing system that conforms to the City of New York Building Code, ASTM E985 and CFR 29, Part 1910.23, including the 200 pound loading requirement, and including the requirement that specific types of occupancies and sizes of contributing protected areas shall incorporate greater design load resistance into aluminum pipe railing system, in compliance with ASTM E985, than that specified herein.

a. Completed handrail and railing shall withstand a uniform lateral force of 50 pounds per linear foot and a vertical uniform downward force of 50 pounds per linear foot, both applied simultaneously at the top of the handrail and railing, performance tested in accordance with Test Method A and B of ASTM E935.

b. Intermediate and bottom rails shall withstand simultaneously applied lateral uniform forces of 40 pounds per linear foot and a vertical load of 50 pounds per linear foot, however, lateral and vertical loads on intermediate and bottom railings need not be considered in the detailing and fabrication of posts and anchorages.

c. For railings having solid panels or picket balusters, the panels or picket balusters shall be detailed and fabricated to withstand a uniform lateral load of 50 pounds distributed over any round or square area of one square foot located anywhere within the infill area or a 50 pound per foot penetration cone, performance tested in accordance with Test Method C and D of ASTM E935.

d. Concentrated 200 pound load and uniform force conditions shall not be applied simultaneously.

e. Other pertinent requirements ceded to ANSI A1264.1 by governing authorities having jurisdiction at the Site.

f. Bending stresses shall not exceed 60 percent of the yield stress of the material. Applied loads shall not produce permanent residual deformation in the completed work when loads are removed. Load-deformation data shall be determined in accordance with ASTM E935.

g. Maximum allowable deflections shall be in accordance with ASTM E985.

h. Where computations make it possible to provide the needed information, testing, in compliance with ASTM E935, shall be performed for verification that aluminum pipe railing system and auxiliary system components comply with specified performance requirements and the requirements of governing authorities having jurisdiction.

3. Thermal Control: Provide adequate expansion within the fabricated system that allows for a thermal expansion and contraction caused by a material temperature range of 140 degrees F to -20 degrees F without warp or bow of system components. Distance between expansion joints shall be based on providing a 1/4 inch wide joint at 70 degrees F which accommodates a movement of 150 percent of the calculated amount of movement for the specified temperature range.

4. Provide expansion joints in handrail and railing system work where systems cross expansion joints in structure.

5. Configuration of all aluminum pipe handrail and railing systems shall be as shown on the Contract Drawings General Railing and Handrail Sheet. All details shown on the Contract Drawings are typical; similar details apply to similar conditions, unless specifically noted otherwise on the Contract Drawings.

6. Manufacturer is responsible for structural analysis and detailing of aluminum pipe handrail and railing system. Provide complete structural performance calculations and Shop Drawings for all aluminum pipe handrail and railing members, anchors and all other support system components prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of New York and recognized as an expert in the specialty involved.

G. Anchors and Supports:

1. Anchorage system shall be structurally analyzed based on results of tests in compliance with ASTM E488 and ASTM E894. Anchors shall be tested for static, seismic, fatigue and shock loadings in series. Static tests shall include tension, shear, flexure, and torsion load resistance.

2. When the size, length or load carrying capacity of an anchor bolt, concrete anchor or concrete insert is not shown on the Contract Drawings, provide the size, length and capacity required to carry the design load times a minimum safety factor of four when installed in cast-in-place concrete and a minimum safety factor of six when installed in unit masonry construction.

3. Sizes shown on the Contract Drawings shall be considered minimum. Increase size to comply with design loadings and minimum safety factors specified.

4. All railing system posts shall be provided with a circular profile solid bar.

H. Allowable Tolerances:

1. Provide “pencil-line” thin butt joints.

2. Limit variation of cast-in-place inserts and sleeves to the following:

a. Spacing: ± 3/8 inch.

b. Alignment: ± 1/4 inch.

c. Plumb: ± 1/8 inch.

3. Minimum Railing System Plumb Criteria:

a. Limit variation of completed handrail and railing system alignment to 1/4 inch in 12 feet - 0 inches with posts set plumb to within 1/16 inch in 3 foot - 0 inches.

b. Align rails so variations from level for horizontal members and from parallel with rake of stairs and ramps for sloping members do not exceed 1/4 inch in 12 feet - 0 inches.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited, to the following:

1. Samples:

a. Full size sample, 2 foot - 0 inches long, of assembled aluminum pipe railing system at post and rail intersections with all associated components including typical mechanical and adhesively fastened connections, mounted toe-board and sleeve, and handrail system at wall return complete with mounting brackets all with specified anodized finish.

b. Color Samples: Maximum range of anodized aluminum finish color variation that shall appear in finished work. Prepare range samples, to show the highest level of color control feasible for actual aluminum pipe railing and handrail system work, as determined by the licensor of the finishing process selected, on actual extrusions and castings of the work.

c. Samples will be reviewed by Engineer for color, finish, joinery appearance and workmanship only. Compliance with all other requirements is the responsibility of Contractor.

2. Shop Drawings:

a. Drawings for the fabrication and erection of aluminum pipe railing and handrail systems with sizes of members, components and anchorage devices, all based on specified requirements. Indicate that Shop Drawings have been reviewed by the professional engineer preparing, signing and stamping its seal on design calculations and engineering analyses, verifying that the manufacturer’s proposed fabrication, installation methods and details adequately translate the results of the design calculations and engineering analyses into the work, before submitting Shop Drawings to Engineer for review.

b. Include copies of manufacturer's specifications, standard and custom detail drawings and installation instructions and manufacturer’s catalogs showing complete selection of standard and custom components, auxiliary system components and miscellaneous accessories for selection by Engineer. Include all plans and elevations identifying the location of all railing and handrails, and all expansion joints.

c. Profiles of aluminum pipe railing and handrail system components, and the details of forming, jointing, sections, connection, internal supports, trim, and accessories. Show details of the aluminum pipe railing and handrail drawn at 1-1/2 inch scale.

d. Calculations for the complete design and engineering analysis of the aluminum pipe railing and handrail system, auxiliary system components and anchorages, including calculations showing compliance with performance criteria specified, prepared, signed and stamped with the seal of a registered professional engineer

licensed to practice in the State of New York and recognized as an expert in the required work.

3. Maintenance Manuals (O&M Manuals): Upon completion of the installation of the aluminum pipe railing and handrail systems, submit the following:

   a. Product name and manufacturer.

   b. Name, address and telephone number of manufacturer and local distributor.

   c. Detailed procedures for routine maintenance and cleaning, including recommended cleaning materials, application methods and precautions as to use of materials that may be detrimental to finish when improperly applied.

4. Certificates:

   a. Copies of material purchase receipts, for this job, signed by a certified and licensed Notary Public, verifying that material purchased for the Work complies with material designations specified as confirmed by approved Shop Drawings.

   b. Furnish certification that laboratory loading tests have been performed on the handrail, railing and anchorage systems verifying compliance with performance criteria specified, and that it conforms to all applicable CFR, ANSI and ASTM requirements for loads and deflections and that the data derived from such tests has been used by the registered professional engineer in the design calculations and engineering analyses of the aluminum pipe railing and auxiliary system components.

   c. Registered professional engineer who prepares, signs and stamps its seal shall provide a written statement confirming responsibility for the design and attesting that the design prepared meets the performance criteria required by the Contract Documents, the requirements of governing authorities having jurisdiction, and conforms to prevailing standards of practice.

   d. Finish: Furnish a written certificate confirming specified anodized coating film thickness, coating weight, sealing treatment and stain test performance.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver aluminum pipe railing and handrail and all accessories dry and undamaged, with manufacturer's protective coating intact, bearing original intact factory labels.

2. Aluminum pipe railing systems which are damaged during delivery or while being unloaded shall not be stored on Site. Remove such units from Site and replace panels with new, undamaged material.

B. Storage of Materials:

1. Store aluminum pipe railing and accessory materials in a dry location and in a manner that will protect strippable coating from exposure to sun and condensation; with good air circulation around each piece and with protection from windblown rain.

2. Store aluminum pipe railing and accessory materials under tarpaulin covers and in an area protected from dirt, damage, weather and from the construction activities of all Contractors. Do not store outside or allow items to become wet or soiled in any way while on Site.

3. Do not store in contact with concrete, earth or other materials that might cause corrosion, staining, scratching or damage to finish. Do not install system components which become dented, scratched or damaged in any way. Remove such components from Site and replace with new, undamaged material.

C. Handling of Materials:

1. Do not subject aluminum pipe railing and accessory materials to bending or stress.

2. Do not damage edges or handle material in a manner that will cause scratches, warps or dents.

3. Keep on-Site handling to a minimum.

4. Maintain protective covering on railings and handrails. All surface protective coverings such as non-adhesive papers, adhesive papers and strippable plastic films shall be removed after receipt at the Site as soon as there is no longer a need for the protection.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

1. Railings

a. Custom Fabricated Connectorail System as manufactured by Julius Blum & Company, Inc., Carlstadt, NJ.

b. Custom Fabricated Series 500 Non-Welded Aluminum Pipe Railing as manufactured by Superior Aluminum Products, Inc., Russia, OH.

c. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Extruded Aluminum Architectural and Ornamental Shapes: ASTM B221, Alloy 6063-T52.

B. Aluminum Forgings: ASTM B247.

C. Extruded or Drawn Aluminum Pipe and Tube:

1. ASTM B429 or ASTM B241, Alloy 6063-T5, 6063-T52 or 6063-T832 as required by loadings, deflections and post spacing's specified.

2. Provide Schedule 40 pipe minimum, unless conditions of detail and fabrication require extra heavy pipe to comply with performance criteria specified.

3. Provide all rails and posts with minimum outside diameter of 1.900-inches; nominal size of 1-1/2-inches.

D. Aluminum Finish:

1. Clear anodized finish 204-R1 (AA-C22-A31)

2. Surface Depth: minimum .4 mils.

E. Reinforcing Bars:

1. Solid 24-inch long 6061-T6 circular cross section aluminum reinforcing bars with outside diameter same as inside diameter of post.

F. Anchors and Fastenings:

1. Type 316 stainless steel.

2. Provide minimum of four bolt fasteners per post where surface mounted posts are shown. Components shall be in accordance with manufacturer's recommendations and as acceptable to Engineer as shown on approved Shop Drawings.

3. Concrete and masonry anchors shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

4. Anchors shall be of stainless steel Type 316 and a minimum size of 1/2-inch diameter.

5. Bolting Materials: As specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

G. Castings:

1. Provide high strength aluminum alloy brackets, flanges and fittings suitable for anodizing as specified.

2. Aluminum-Alloy Sand Castings: ASTM B26.

H. Concealed Connector Sleeves: Schedule 40, 5-inches long by 1.610-inches diameter.

I. Brackets and Flanges: Provide manufacturers complete selection of standard and custom brackets and flanges for railing posts and for handrail supports.

J. Sockets: Provide 6-inch deep by 2-1/2-inch outside diameter aluminum sockets with 3-1/2-inch wide socket cover on bottom of all sockets and on top and bottom of removable post sockets.

K. Hinges: Provide two self-closing aluminum hinges for each railing system gate.

L. Gate Latches and Stops: Provide one latch and stop with rubber bumper and 1-inch diameter plastic knob for each railing system gate.

M. Chain, Snaps and Eye Bolts: Provide oblong 0.250-inch aluminum link, Type 316 stainless steel chain weighing 57 pounds per cubic foot, each link 1-1/8-inch by 7/16-inch. Provide stainless steel eyebolts, 1/4-inch stainless steel threaded quick links and heavy duty swivel snaps with spring loaded latch.

N. Custom Cover Flanges: Provide 1/4-inch high by 4-inch diameter aluminum cover flanges for all non-removal posts and 3-1/2-inch wide by 1-1/8-inch high aluminum pipe collars with 1/4-inch set screws for all removable posts.

O. Auxiliary System Components and Miscellaneous Accessories: Provide a complete selection of manufacturer's standard and custom aluminum handrail and railing components and miscellaneous accessories including, but not limited to, fascia flanges, post brackets, interlocking panel clips, clamps, end caps, post caps, adapters and similar items.

P. Adhesive: Two-part waterproof epoxy-type as recommended by railing and handrail manufacturer.

Q. Non-Shrink, Non-Metallic Grout:

1. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and is recommended by the manufacturer for exterior use.

2. Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous, cementitious grout, complying with ASTM C1107, requiring only the addition of water at the Site.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Unless otherwise shown or specified in the Contract Documents provide typical non-aluminum construction details and fabrication techniques as recommended by AMP/NAAMM publications specified.

2. Railings

a. Form exposed Work true to line and level with accurate angles, surfaces and straight edges. Fabricate all corners without the use of fittings. Form bent-metal corners to the radius shown without causing grain separation or otherwise impairing the Work. Form all change in handrail and railing direction with radius bends. Provide not less than 4 inch outside radius.

3. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail or railing components. Provide for expansion and contraction in the railing system as required by performance criteria. At each side of expansion joints located in the structure to which the railing system is attached, provide an end post and railing return located 16 inches from the joint. Separation between returns shall match the width of the structure expansion joint.

1)

b. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges and ease exposed edges to a radius of approximately 1/32 inch.

c. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with smooth finished surfaces, or use prefabricated bends.

d. Locate intermediate rails equally spaced between top rail and finished floor.

e. Close aluminum pipe ends by using prefabricated fittings.

4. Chains

a. Chains shall be provided across openings in aluminum pipe railing where shown on the Contract Drawings. One end of each chain shall be attached to a 1/4-inch eye bolt in the post and the other end shall be attached by means of an approved heavy stainless steel swivel eye snap hook to a similar eye bolt in the opposite post.

B. Weep Holes

1. Fabricate joints which will be exposed to the weather so as to exclude water.

2. Provide 15/64 inch diameter weep holes at the lowest possible point on all railing system posts.

3. Provide pressure relief holes at closed ends of handrails and railings.

C. Reinforcing Bars

1. Provide circular profile solid reinforcing bar friction-fitted at all railing system posts. Extend reinforcing bars 6-inches into cast-in-place sleeves or other types of supporting brackets.

D. Mechanically Fitted Component Pipe Handrail and Railing

1. Blind rivets, pop rivets or other exposed fastening devices shall not be used in the Work. Fasteners used for side mounting fascia flanges where shown or specified may be exposed in the Work. Provide internally threaded tubular aluminum rivets, stainless steel through bolts with lock nuts, stainless steel sheet metal screws with lock-washers and epoxy adhesive for fastening all components of the Work.

2. Provide for expansion and contraction in the railing system as required by performance criteria. At each side of expansion joints located in the structure to which the railing system is attached, provide an end post and railing return located 16 inches from the joint. Separation between returns shall match the width of the structure expansion joint.

E. Finishes

1. General:

a. Prepare surfaces for finishing in accordance with recommendations of the aluminum producer and the finisher or processor.

b. Adjust and control the direction of mechanical finishes specified to achieve the best overall visual effect in the work.

c. Color and Texture Tolerance: Provide uniform color and continuous mechanical texture for all aluminum components of the work. Engineer reserves the right to reject aluminum materials because of color or texture variations, which are visually objectionable, but only where the variation exceeds the range of variations established by the manufacturer prior to the work, by means of range samples which have been accepted by Engineer.

d. Anodize all aluminum components of the work.

2. Mechanically finish aluminum by wheel or belt polishing with aluminum oxide grit of 180 to 220 size, using peripheral wheel speed of 6,000 feet per minute; Aluminum Association Designation - M32 Medium Satin Directional Texture.

a. Hand Rubbed Finish: Where required to complete the work and provide uniform, continuous texture, provide hand rubbed finish to match medium satin directional texture specified in order to even out and blend in satin finishes produced by other means.

3. Provide non-etching chemical cleaning by immersing the aluminum in an inhibited chemical solution, as recommended by the coating applicator, to remove all lard oil, fats, mineral grease and other contamination

detrimental to providing specified finishes. Clean and rinse with water between steps as recommended by the aluminum manufacturer.

4. Exposed Aluminum Anodic Coating: Provide anodic coatings as specified which do not depend on dyes, organic or inorganic pigments, or impregnation processes to obtain color. Apply coatings using only the aluminum alloy, temperature, current density and acid electrolytes to obtain specified colors in compliance with the designation system and requirements of the Aluminum Association and AMP 501 of AMP/NAAMM. Comply with the following:

   a. Provide Architectural Class I high density anodic treatment by immersing the components in a tank containing a solution of 15 percent sulfuric acid at 70 F with 12 amperes per square foot of direct current for minimum of sixty minutes; Aluminum Association Designation A41 - Clear (natural).

   b. Physical Properties:

      1) Anodic Coating Thickness, ASTM B244: Minimum of 0.7 mils thick.

      2) Anodic Coating Weight, ASTM B137: Minimum of 32 mg/sq. in.

      3) Resistance to Staining, ASTM B136: No stain after 5 minutes dye solution exposure.

      4) Salt Spray, ASTM B117: 30,000 hours exposure with no corrosion or shade change.

   c. Seal finished anodized coatings using deionized boiling water to seal the pores and prevent further absorption.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Source Quality Control:

1. Obtain all aluminum pipe railing and handrail system components and accessories from the same manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall examine the alignment of the substrate and conditions under which the aluminum pipe railing system work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the aluminum pipe railing system work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Protection: Protect cast-in-place sleeves and field-drilled holes from debris and water intrusion by use of temporary covers or removable foam inserts that completely fill the cast-in-place sleeve.

C. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and installation instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in cast-in-place concrete or masonry. Deliver to Site in time for installation.

D. Verify dimensions by taking measurements at the Site without causing delay in the work. Where measurements cannot be taken at the Site without delaying the work, establish dimensions and proceed with fabrication of handrails and railings without Site measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

E. Verify to Engineer gage of aluminum pipe railing posts and rails brought to the site by actual measurement of on-Site material in the presence of Engineer.

3.02 INSTALLATION

A. Fastening to In-Place Construction

1. General:

a. Do not erect components which have become scarred, dented, chipped, discolored or otherwise damaged or defaced. Railing and handrail system components which have holes, cuts, gouges, deep scratches or dents of any kind shall be removed from the site before installation. Repairs to correct such Work shall not be approved by Engineer. Remove and replace with new material.

b. Comply with installation and anchorage recommendations of AMP/NAAMM publications specified in addition to the requirements specified herein.

2. Posts and rail sections shall be brought into final alignment by aluminum pipe railing installer.

3. Provide anchorage devices and fasteners where necessary for securing railing and handrail items to in-place construction, including threaded fasteners for concrete and masonry inserts, through-bolts and other connectors as required. Use only Type 316 stainless steel devices and fasteners.

4. Flanged fittings shall be secured to steel with nuts, bolts and washers; to hollow glazed structural tile and masonry with masonry anchors; and to solid grouted masonry and concrete with concrete anchors. Flanges not bearing on metal shall be set in non-shrink grout.

5. Anchor posts in concrete by means of sockets and side mounted fascia flange brackets, set and anchored into the concrete floor slabs and sides of concrete walls and raised walkways. Provide closure secured to the

bottom of sleeve. Before installing posts remove all debris and water from sleeves. Verify that reinforcing bars have been inserted into posts before installation. Do not install posts without reinforcing bar. For all non-removable railing sections, after the posts have been inserted into the sockets, fill the annular space between posts and sockets solid with grout.

6. Anchor posts to stair stringers with stringer or support flanges, angle type or floor type as required by conditions, shop connected to posts and bolted to the supporting members. Flanges shall be as recommended by manufacturer. Verify that reinforcing bars have been inserted into posts before installation. Do not install posts without reinforcing bar.

7. Provide removable railing sections where shown. Removable railing posts shall be provided with friction fitted reinforcing bar in each post. Provide sockets with socket covers stored in extruded toe-board. Provide aluminum pipe collars for all removable posts. Accurately locate sleeves to match post spacing's.

8. All posts set in concrete shall be provided with an aluminum floor cover flange.

9. Provide end posts and railing returns at 16-inches on each side of structural expansion joints. Separation between returns shall match the width of the structural expansion joint.

B. Cutting, Fitting and Placement

1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

2. Fit exposed connections accurately together to form tight hairline joints. Do not cut or abrade the surface of units which have not been finished after fabrication, and are intended for field connections.

3. Permanent field splice connections shall be made using manufacturer's recommended epoxy adhesive and 5-inch minimum length connector sleeves. Tight press-fit all field splice connectors and install in accordance with manufacturer's written instructions as provided on approved Shop Drawings. Follow epoxy manufacturer's recommendations for require-ments of installation and conditions of use. Make all splices as near as possible to posts but not exceeding 12 inches from nearest post.

4. Handrails supported from walls, partitions and similar construction shall be supported by brackets located within 18 inches of handrail terminations and at intermediate points spaced not more than 5 feet on center. Drill wall plate portion of the mounting bracket to receive one bolt, unless otherwise shown on the Contract Drawings as concealed anchorage. Provide flush-type wall-return fittings with the same projection as that shown for mounting brackets. Secure mounting brackets and wall-return fittings to building construction as follows:

a. For concrete and solid masonry anchorage, use bolt anchor expansion shields and lag bolts.

b. For hollow masonry anchorage, use toggle bolts having square heads.

5. Space posts 5 feet - 0 inches on center and connect sections as shown on Shop Drawings approved by Engineer.

6. Provide expansion joints with slip joint internal sleeve extending 2 inches minimum beyond joint on each side. Fasten internal sleeve on only one side of expansion joint.

7. Where details show post location requirements at or near end of runs, uniformly space intermediate posts as required to meet loading and deflection criteria specified but not greater than maximum spacing specified.

a. At walkways and other locations where welded pipe railing system is provided on each side, locate railing system posts aligned opposite each other and with the same on center spacing.

8. Provide hinged railing sections where shown on the Contract Drawings. Provide hinges and latch for connection to adjacent railing.

9. Provide chain sections as shown. Provide one chain length with fastening accessories for top and each intermediate railing.

10. Securely fasten toe-boards in place with not more than 1/4 inch clearance above floor level.

11. Drill one 15/64 inch diameter weep hole not more than 1/4 inch above the top of location of circular profile solid reinforcing bar in each post.

12. Protection from Dissimilar Materials:

a. Coat all surfaces of aluminum in contact with dissimilar materials such as concrete, masonry and steel as specified in Section 09900.

13. Remove coating where exposed in the finished work.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting

1. Adjust railings and handrails prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Plumb posts in each direction.

B. Protection

1. Protect aluminum pipe railing system from damage by the work of all contractors.
2. Remove defective aluminum railing system components immediately upon discovery of damage, and replace with material that meets specification requirements, so that all aluminum pipe railing system components will be without damage or surface blemish at the time of Substantial Completion

C. Cleaning

1. Clean exposed surfaces of aluminum pipe railing Work of every substance before leaving the site after completion of installation. Comply with recommendations of both the aluminum pipe railing and finish manufacturer. Do not use abrasives or non-approved solvent cleaners. Test cleaning techniques on an unused section of railing before employing cleaning technique in the Work.
    a. Remove protective plastic as recommended by manufacturer.
    b. Remove all stains, dirt, grease and other substances by washing railings and handrails thoroughly using clean water and soap. Rinse with clean water.
    c. Do not use acid cleaning solutions, steel wool or other harsh abrasives.
    d. If stains remain after washing, remove finish and restore in accordance with recommendations of the manufacturer.
2. At the completion of the work, replace adjacent work, marred by the work of this Section.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05 59 16 – FABRICATED METAL ACCESS HATCHES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, fabricate and install aluminum and stainless steel fabricated metal access hatches as shown on the Contract drawings and specified herein. The hatches shall be provided complete with all accessories and fastenings required for a complete and operational installation.

1. Access hatches shall be installed horizontally and used for access in floors or decks and have a hinge cover with springs, hold-open arms, locking mechanism and a fall protection system.

B. Fabricated metal access hatches specified herein shall include sidewalk, roadway and floor access hatches that are intended to be mounted into cast concrete.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Installation	10
3.03	Field Testing / Quality Control	11
3.04	Startup / Demonstration	11
3.05	Adjusting / Protection / Cleanup	11

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. 01 43 10 – Quality Assurance Inspections

B. Section 05 06 00.01 - Schedules for Stainless Steel Work

C. Section 05 05 13.01 - Galvanizing

D. Section 05 05 23.01 - Welding

E. Section 05 05 23.02 - Miscellaneous Metal Fastening

F. Section 05 12 00 - Structural Steel Framing

G. Section 05 50 00 - Miscellaneous Metal Castings

H. Section 05 52 13.07 - Aluminum Pipe Railing

I. Section 09 91 00 - Painting

1.04 REFERENCES

A. AAMA 611 - American Architectural Manufacturers Association Specification for Anodized Architectural Aluminum

B. ASTM B209 - Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C. ASTM A240 - Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications

D. ASTM A262 - Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

E. ASTM A276 - Specification for Stainless Steel Bars and Shapes

F. ASTM A313 - Specification for Stainless Steel Spring Wire

G. ASTM A480 - Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plates, Sheet and Strips

H. ASTM A666 - Specification for Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

I. ASTM B221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

J. ASTM B308 - Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

K. ASTM B632 / B632M - Specification for Aluminum-Alloy Rolled Tread Plate

L. ASTM C1802 - Standard Specification for Design, Testing, Manufacture, Selection and Installation of Fabricated Metal Horizontal Access Hatches for Utility, Water and Wastewater Structures

M. ANSI/AWS D1.1 - Structural Welding Code – Steel

N. ANSI/AWS D1.2 - Structural Welding Code – Aluminum

O. ANSI/AWS D1.6 - Structural Welding Code – Stainless Steel

P. New York City Building Code (NYCBC)

1.05 DESCRIPTION

A. Access hatch sizes shall be as shown on the Contract Drawings.

B. Covers shall be equipped with hold-open arm(s), springs, hinges and locking mechanism.

C. Lifting Mechanism:

1. Access hatches shall be designed to provide the proper amount of lift assist to assure access hatch cover(s) can be opened by one person with no more than 35 pounds of vertical lifting force.

D. Fall Through Protection

1. All access hatches shall have permanent means of fall protection complying with OSHA 29 CFR 1910.23 and NYCDEP EHS.

a. Furnish and install fall protection grating system on access doors, where indicated on the Contract Drawings. The grating system shall be fabricated as part of the access hatch assembly.

b. Fall through protection shall consist of fiberglass or aluminum grating panel(s), lift assist, hold open arm and hardware, and locking mechanism.

2. Removable Safety Barrier Chains

a. Stainless steel safety chains with latches shall be provided and attached to the railing system for additional safety.

3. Safety Railings

a. Safety railings shall be installed in cases where grating panels are not installed or as indicated on the Contract Drawings.

E. Access hatches in sidewalk areas shall comply with the NYCBC.

1.06 QUALITY ASSURANCE

A. Access hatches shall be detailed and fabricated based on calculations prepared by the manufacturer and sealed by a NYS Registered Professional Engineer, indicating that the access hatch is capable of withstanding loads to meet the specified types of access hatches.

B. The Contractor shall require that the manufacturer of the hatches furnish the fall through protection and be responsible for the integration and compatibility of all equipment components provided under this Section.

C. Quality Assurance (QA) Inspections

1. QA inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. QA Inspections shall be in accordance with Section 01 43 10 – Quality Assurance Inspections.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that the QA inspection may be made.

4. QA inspections may include, but are not limited to the following activities:

a. Obtain representative material samples

b. Obtain copies of certified materials test reports, both chemical and physical, and test report for susceptibility to intergranular corrosion of the stainless steel material, as applicable.

c. Perform visual inspection of welding, as per AWS D1.6.

d. Perform visual and dimensional inspection welding of completed work.

D. Manufacturers shall have a minimum of ten (10) years' experience in the design and fabrication of Access Hatches of similar size, capacity, and type to those shown and specified herein, and who have in the opinion of the Engineer sufficient experimental and test data to confirm the design of the specified Access Hatches.

1.07 SUBMITTALS

A. The Contractor shall submit shop drawings for approval by the Engineer.

B. Shop Drawings shall be signed and sealed by a NYS Registered Professional Engineer. At minimum each detailed drawing and calculation packet shall be signed and sealed.

C. Shop drawings shall include the following:

1. General layout drawings showing overall frame dimensions, opening at the base of the frame, clear opening size, thickness of the frame and the overall height of the frame, profiles, accessories, location adjacent construction interference and all dimensions and details.

a. Accessories include drain location, fall through grating details with clearances, and safety barrier chain locations.

2. A list of material manufacturer(s) with the products they manufacture or fabricated, including but not limited to mill test reports.

3. All materials used during the access hatch manufacturing shall be identified by thickness, size, and grade to assure that the appropriate materials are used specific to the hatch design being manufactured.

4. Copies of specifications, installation instruction and general recommendations for each access hatch supplied. Manufacturer's data substantiating that all materials comply with the requirements of this specification.

5. Design calculations and manufacturer's Engineering/product data including prototype test results, design details.

6. Certifications, structural calculations, detailed drawings, plans, elevations, and details of sections and connections

7. Calculations verifying compliance with the performance criteria.

8. Shop drawings shall indicate jointing and anchoring details.

9. Welding procedure specifications and welder and welder operator Certifications shall be as per AWS D1.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Access hatches shall be handled in such a manner that they are transported, unloaded and stored without being over-stressed, deformed or otherwise damaged.

B. Shall be transported, handled and stored as per the manufacturer's instruction and recommendations.

1. The access hatches and components shall be stored and covered in a dry, protected and clean location off the ground.

2. All unfinished surfaces are to be protected from exposure and damage.

C. Coatings shall be applied in the shop; the units are to be delivered ready for installation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor obtain from the manufacturer and provide a manufacturer's warranty, in an acceptable and beneficial form, that access hatches will be free of defects in material and workmanship for a period of 10 years from the date of Substantial Completion. Under the terms of this warranty, should a part fail to function in normal use within this period, the manufacturer shall furnish a new part at no charge.

B. The Contractor shall obtain from the manufacturer and provide a manufacturer's 10-year warranty, in an acceptable and beneficial form, for the fall protection grating system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access hatches shall be manufactured by:

1. The Bilco Company, New Haven, CT;
2. Acudor Products, Inc. brand, manufactured by USF Fabrication, Hiaheah, FL;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Aluminum

1. Shapes and plates shall be 6061-T6 aluminum alloy with mill finishes and shall be fabricated into finished products with welded or bolted connections as detailed in the Contract Drawings or approved Shop Drawings.
2. Extruded shapes shall meet the requirements of ASTM B221 and B308.
3. ASTM B209 and B632 / B632M, alloys 5052 or 5086.
4. The covers and frame of all hatches shall have a clear anodized shop finish.

B. Stainless Steel

1. Stainless steel shapes and plates shall be Type 316 for bolted construction and Type 316L for welded construction as detailed on the Contract Drawings or approved Shop Drawings and conforming to Section 05 06 00.01 – Stainless Steel Work.
2. Shapes shall meet the requirements of ASTM A276.
3. Plates shall meet the requirements of ASTM A480 and A666.
4. Type 316L stainless steel shall meet the requirements of ASTM A240, UNS S31603.

C. Access hatch

1. Floor access hatches shall be double leaf hatches except for openings less than 4 feet long which shall have single leaf hatches. Hatch size shall be as shown on the Contract Drawings.
2. Hatch leaf shall be manufactured of minimum ¼ inch thick aluminum or stainless steel diamond-pattern plate designed to withstand a live load as indicated on the Contract Drawings for the adjacent floor or deck area.
3. Hatch loading requirements shall be as designated on the Contract Drawings.

D. Frame

1. Channel or tee type frame shall be aluminum with an anchor flange around the perimeter and with a 1-1/2 inch drainage coupling where required.

E. Hinges

1. Hinges shall be heavy duty forged Type 316 stainless steel hinges, having a minimum ¼ inch diameter Type 316 stainless steel pin.

2. Hinges shall be specifically designed for horizontal installation and shall be through bolted to the covers with tamperproof Type 316 stainless steel bolts and locknuts.

F. Drain Coupling

1. Provide a 1-1/2 inch drain coupling located in the right front corner of the channel frame or located as indicated on the Contract Drawings.

G. Lifting Mechanism

1. Manufacturer shall provide the required number and size of compression spring operators, enclosed in telescopic tubes, to provide smooth, easy and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be outer tube to prevent accumulation of moisture, grit and debris inside the lower tube assembly. The lower tube shall interlock with a flange support shoe fastened to a formed ¼ inch gusset support plate.

2. Springs shall be sufficient to provide the appropriate amount of lift for each door. Spring shall also be designed to counterbalance the specific cover weight throughout arc and to resist downward force when closing.

3. Compression spring tubes shall be an anti-corrosive composite.

H. Hold-open Arms

1. A Type 316 stainless steel hold open arm shall be provided to lock the cover in the fully open 90 degree position. A release handle shall be provided to allow the grating panel to be closed.

I. Hardware

1. Hatches shall be equipped with recessed padlock hasps. All hardware, including but not limited to mounting brackets, heavy forge hinges, torsion rod, hold open arm with release handle, snap lock, padlock hasp and fasteners shall be Type 316 stainless steel.

2. Locks shall be included as part of the hatch.

3. The locations of hinges and hold-open arm with release handle shall be as shown on the Contract Drawings and approved Shop Drawings.

J. Fall Through Protection

1. Grating panels shall be provided for all access hatches.
    a. Grating panel(s) shall be manufactured of fiberglass reinforced plastic (FRP) or aluminum.
        1) FRP grating panels shall comply with the following:
            a) UV and corrosion resistant construction
            b) FRP panels shall be molded in one piece or fabricated of 6061-T6 aluminum grating, with load bearing bars in both directions to allow for use without continuous side support.
            c) Grating shall be permanently installed and designed to support a 300 PSF live load.
            d) Aluminum grating panels shall be powder coated with high visibility safety yellow finish.
    b. Grating panels shall have a provision for locking to prevent unauthorized opening.
    c. Hardware and hold-open devices shall be Type 316 stainless steel.
    d. Lift assistance shall be provided for ease when opening the grating panel.
    e. The grate openings shall be 2-inch x 4-inch on center.
    f. Grating panels shall lock in the fully open position.
    g. Grating panels shall open in the same orientation as the hatch doors.
2. Removable safety barrier chains and latches shall be provided.
    a. Chain shall be Type 316 stainless steel.
    b. Safety chains shall be capable of withstanding 1,000 pound of working load and 5,000 pounds of breaking load.
    c. Safety chains shall be removable at both open ends with a maximum 3-inch sag when the hatch is open.

COMPONENTS	HATCH LEAF MATERIAL	
	STAINLESS STEEL	ALUMINUM
Forged Hinges & Hardware	316 Stainless Steel	316 Stainless Steel
Lift Assist Spring Operators	Stainless steel spring enclosed in Type 316 SS housing, ASTM A313.	Spring enclosed in ¾" 316 stainless steel tube
Hold Open Arm	Automatic with release handle Minimum 2 per leaf – one at each end	
Drainage Channel	Minimum cross-sectional area of 7.5 square inches to allow for adequate water drainage	
Diamond plate cover & frame	Minimum ¼ inch thick mill finish	Minimum ¼ inch thick with clear anodized coating
Frame Finish (dissimilar materials)	None	Factory applied bituminous/coating to bond breaker aluminum to concrete
Lock	Recessed padlock hasps. Snap lock with removable handle	
Covers	Min ¼ inch thick mill finish that has been bead blasted to clean the door	Min ¼ inch thick aluminum diamond pattern with anodized coating.
Frame finish	none	Factory applied bituminous/coating

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Finishes

1. Aluminum sidewalk access hatches shall be coated with an anodized finish in accordance with the requirements of AAMA 611 Class 2, with a minimum dry film thickness of 0.7 mils, or as specified or indicated on the Contract Drawings.

2. When indicated in the Contract Documents, aluminum access hatches shall be galvanized in accordance with Section 05 05 13.01 – Galvanizing with a No. 4 finish or as detailed in the Contract Drawings or specified herein.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. The access hatch manufacturer shall have and perform quality control operations based on a written quality control program that includes the following:

1. Review and rejection of incoming materials based on certified mill test reports and visual inspections.
2. Frequency of inspection and inspection requirements for cut or cut and bent assemblies and part for hatch construction, assembly welding and completed hatch assemblies.
3. All quality control inspection reports shall be dated and maintained by the hatch manufacturer for a minimum period of seven years.
4. All prototype test records for custom hatches and all production test records shall be dated and maintained by the hatch manufacturer for a minimum period of seven years.
5. All prototype test records for the manufacturer's standard access hatch designs shall be permanently archived.
6. When requested by DEP at the time of request for quotation the written quality control program and the quality control inspection reports during the period of DEP's access hatch, manufacturing shall be provided.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Number, sizes and location of all access hatches shall be provided as shown on the Contract Drawings and approved Shop Drawings.

B. Install the access hatches in accordance with manufacturer's instructions and approved submittals.

1. Test units for proper function and adjust until proper operation is achieved.
2. Repair finishes damaged during installation.
3. Restore finishes, so no evidence remains of corrective Work.

C. Access hatches and their components shall be adjusted for proper alignment and operation.

D. Protective coatings shall be provided for the exterior protection of aluminum frames that are to be cast in fresh concrete to prevent corrosion.

E. Immediately after installation, the Contractor shall clean all the access hatches using products and procedures that are not detrimental to the finishes and as recommended by the manufacturer.

3.03 FIELD TESTING / QUALITY CONTROL

A. All stainless steel materials shall be checked for compliance with tests for susceptibility to intergranular corrosion. Such tests shall be Practices A, B and E of ASTM A262. Detailed procedures for these tests shall be submitted to the Engineer for approval prior to the start of work. If the certified mill report indicates that such tests have been satisfactorily performed, the fabricator may not be required to repeat the test. Material passing Practice E shall be acceptable.

B. Tolerances

1. Maximum tolerance allowances shall be as outlined in ASTM C 1802, unless indicated on the Contract Documents or by the Engineer.

C. Inspection and Field Verification

1. The Contractor shall verify that the area to receive the access hatch is properly prepared and set to the proper elevation.

2. Contract shall meet the requirements of the manufacturer's installation recommendations and approved Shop Drawings.

D. Repairs

1. Repairs are to be performed as per manufacturer's recommendations and meet the requirements of ASTM C 1802.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07 14 00 – FLUID-APPLIED WATERPROOFING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes a system of 100 percent solids, solvent-free, environmentally friendly, notched or mason's trowel-applied, Polyurethane Elastomeric Membrane waterproofing with NSF 61 approval recommended by the manufacturer for horizontal cast-in-place concrete roof slabs all provided with surface preparation in compliance with ASTM D 4258 and ASTM D 4259 - Abrasive Blast Cleaning Procedure, flashings, ballast, ELD (high voltage Electronic Leak Testing) application, and other components and system accessories necessary to provide watertight performance for conditions and details encountered in the Work. Provide complete technical services as available from the specified manufacturer and on-site technical representation by manufacturer's technical representative. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, test and place into satisfactory service all fluid-applied waterproofing Work.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	8
1.09	Spare Parts, Special Tools, and Supplies	8
1.10	Warranty	9
PART 2	PRODUCTS	9
2.01	Manufacturers	9
2.02	Materials / Equipment	9
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Installation	11
3.03	Field Testing / Quality Control	12
3.04	Startup / Demonstration	12
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used.

1.04 REFERENCES

A. NYSBC – New York State Building Code.

B. ASTM D412 – Vulcanized Rubber and Thermoplastic Rubber and Thermoplastic Elastomers - Tension, Standard Test Methods for.

C. ASTM D448 – Sizes of Aggregate for Road and Bridge Construction, Standard Classification for.

D. ASTM D573 – Rubber - Deterioration in an Air Oven, Standard Test Method for.

E. ASTM D624 – Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers, Standard Test Method for.

F. ASTM D746 – Brittleness Temperature of Plastics and Elastomers by Impact, Standard Test Method for.

G. ASTM D1149 – Rubber Deterioration - Surface Ozone Cracking in a Chamber, Standard Test Method for.

H. ASTM D2240 – Rubber Property - Durometer Hardness, Standard Test Method for.

I. ASTM D4258 – Surface Cleaning Concrete for Coating, Standard Practice for.

J. ASTM D4259 – Abrading Concrete, Standard Practice for.

K. ASTM D4263 – Indicating Moisture in Concrete by the Plastic Sheet Method, Standard Test Method for.

L. ASTM E96 – Water Vapor Transmission of Materials, Standard Test Methods for.

M. ASTM E329 – Agencies Engaged in the Testing and/or Inspection of Materials Used In Construction, Standard Specification for.

N. NSF/ANSI 61 – Drinking Water System Components – Health Effects, Standards for Products.

1.05 DESCRIPTION

A. Environmental Conditions:

1. Proceed with fluid-applied waterproofing Work only when temperature and moisture conditions comply with the fluid-applied waterproofing manufacturer's written recommendations and when no rain or other damaging environmental condition is forecast for the time when the materials will be exposed to potential damage.

2. Apply fluid-applied waterproofing only when material temperature is above 60° F, surface temperature is minimum of 40° F and air temperature is minimum of 40° F and rising.

3. Protect Work from precipitation, frost and direct sun. Erect temporary shelters to protect Work in progress.

4. Proceed with fluid-applied waterproofing only when weather conditions will permit unrestricted use of materials and quality control of the Work being installed, complying with the Section requirements and with the recommendations of the fluid-applied waterproofing manufacturer and only when manufacturer and installer are willing to guarantee the Work as required without additional reservations and restrictions.

5. Record decisions, conditions and agreements to proceed with the Work when weather conditions might be unfavorable. State the reasons for proceeding, with the names of the persons involved along with the changes, if any, or revisions, requirements or terms of the Contract.

B. Pre-installation Conference:

1. Before erecting job mock-up, Contractor, his installers for the fluid-applied waterproofing, contractor responsible for concrete and technical representative of the fluid-applied waterproofing system manufacturer shall meet on-site with Engineer to discuss approved products and workmanship to ensure proper application of fluid-applied waterproofing system components and substrate preparation requirements for the Work.

2. Record the discussions of the conferences and the decisions and agreements or disagreements reached, and furnish a copy of the records to each party attending. Review foreseeable methods and procedures related to the fluid-applied waterproofing Work, including, but not necessarily limited to, the following:

   a. Review project requirements (Drawings, Specifications and other Contract Documents).

   b. Review required submittals, both completed and yet to be completed.

   c. Review status of substrate Work, including approval of abrasive blast surface finish, preparation, drying, structural loading limitations and similar considerations.

   d. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.

   e. Review required inspection, testing and certifying.

   f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including the possibility of temporary waterproofing.

g. Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.

h. Review procedures needed for protection of waterproofing during the remainder of the construction period.

3. Reconvene the meetings at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.

4. Record any revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

C. Protection:

1. Provide continuous protection of materials against damage, wetting and moisture absorption primarily by storing materials under cover and above ground and away from other construction traffic.

2. Protect installed materials and completed systems against damage by construction activities. Exclude all persons not involved with the fluid-applied waterproofing Work from the work area until such time as the Work has been isolated from all potential damage.

D. Scheduling:

1. Proceed with the fluid-applied waterproofing and associated Work after projections and penetrations through the substrates have been installed, and when the substrate construction and framing of openings is complete.

E. Substitutions:

1. Do not change products, system components, installation techniques or manufacturers after Shop Drawing approval by Engineer.

2. Clearly identify, in a manner which is highlighted to Engineer, all proposed substitutions, modifications, variations, unspecified features and "or equal" products. Provide complete comparative data with specified products at time of Shop Drawing submission.

1.06 QUALITY ASSURANCE

A. Source Quality Control:

1. Engage a single manufacturer who shall provide the services of a Technical Representative who shall assist Contractor and Engineer by providing technical opinions on the adequacy of materials, methods of installation and field testing methodology and significance of test results based on Shop Drawings approved by Engineer.

2. Provide such services during the time of delivery, storage, handling, installation and testing of all fluid-applied waterproofing components.

3. Provide a manufacturer who will provide complete technical services including preparation and review of Shop Drawings, installation methods and proposed detailing for the Work. Where the manufacturer requires

additions, or changes to the Contract Drawings and Contract Specifications these shall be made at no additional expense to DEP and only as acceptable to Engineer.

4. Fluid-applied waterproofing system shall incorporate only the highest quality materials, environmental features, and methods of construction and installation as recommended by the manufacturer and as acceptable to Engineer.

B. Installer Qualifications:

1. Engage a single installer skilled, trained and with successful experience in the application of each product who is a licensee of the manufacturer, or who can submit evidence in writing of being acceptable to the manufacturer and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit name and qualifications to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owners, architects or engineers responsible for projects.

b. Approximate contract cost of the fluid-applied waterproofing.

c. Amount of area installed.

2. Submit proof of acceptability of installer by manufacturer to Engineer.

C. Performance Criteria:

1. Contractor's Review: Accompanying approval request, submit to Engineer a written statement signed by Contractor, stating that the Contract Drawings and Specifications have been reviewed with an agent of the fluid-applied waterproofing material manufacturer and that he is in agreement that the selected systems are proper and compatible and that the details used for the Work are not in conflict with the manufacturer's details.

2. Statement of Application: Upon completion of the Work, submit a notarized statement to Engineer signed by Contractor stating that the Work complies with the requirements of the manufacturer's printed instructions and were proper and adequate for the condition of installation and use.

3. Do not thin fluid-applied waterproofing. Do not request the use of spray application. Requests by Contractor for spray application will not be approved by Engineer. Resulting consequences of additional time spent by Contractor in attempting to have such requests approved shall be at no additional expense to DEP regardless of final determination on product use. All expenses caused by such attempts shall be at the expense of Contractor. Apply all fluid-applied waterproofing with a notched or mason’s trowel.

D. Testing Agency: Engage a testing agency regularly engaged in high voltage Electronic Leak Detection testing of waterproofing installations, and who complies with ASTM E 329.

E. Allowable Installation Tolerances:

1. Do not install Work until substrate preparation and tolerances have been approved by Engineer, fluid-applied waterproofing manufacturer's Technical Representative and the fluid-applied waterproofing installer and Contractor has verified to Engineer that substrates are within tolerances specified and acceptable to produce approved Work. Work advanced for any reason without such verification shall be stopped, removed and replaced with new material after substrate is approved at no additional expense to DEP.

2. Substrate Tolerances:

a. Out-of-Plane: 1/8 inch maximum in 10 foot - 0 inches and 1/16 inch maximum in any 12 inches measured along the plane.

b. Maximum Offset in Plane Alignment: 1/16 inch.

c. Variation From Slope: 1/8 inch maximum in 10 foot - 0 inches.

F. Requirements of Regulatory Agencies:

1. All material provided under this Section shall comply with the requirements of the Contract.

2. Comply with all applicable requirements of governing authorities and codes for all Work.

G. Job Mock-Ups:

1. Not Used.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to:

1. Samples: Submit for approval the following:

a. Fluid-applied waterproofing system (all components) applied to a 12-inch by 12-inch by 2-inch thick concrete sample demonstrating specified surface preparation to be used on job mock-up and specified thickness of fluid-applied waterproofing. Apply waterproofing to only one-half of the sample board, leaving the other half visible and showing specified substrate preparation.

b. Samples will be reviewed by Engineer for general appearance and as examples of the types of components to be installed on the job mock-ups. Compliance with other requirements is the responsibility of Contractor.

2. Certification, Health Effects: for NSF/ANSI 61 product compliance.

3. Shop Drawings: Submit for approval the following:

a. Copies of specifications, installation instructions and general recommendations from the fluid-applied waterproofing manufacturer, for each type of fluid-applied waterproofing product.

b. Drawings showing extent of each component of each system used in the Work and all details for the Work referencing system components provided as samples to Engineer. Provide Shop Drawings coordinated with cast-in-place concrete, system terminations, and other conditions encountered in the Work and manufacturer's approved and recommended details appropriate to waterproof these joints and transitions as required for full fluid-applied waterproofing system waterproof performance whether or not specific indication is made on the Contract Drawings to the details of the specified manufacturer.

4. Test Reports: Submit for approval the following:

a. Copies of test reports verifying compliance with physical properties specified herein.

b. Copies of testing agencies background and experience in preforming similar tests to those specified.

B. Certificates, Waterproofing. Submit for approval the following:

1. Copies of certificates stating that the fluid-applied waterproofing systems installer has been approved, or is a licensee of the fluid-applied waterproofing manufacturer.

2. Evidence of installer's experience.

3. Evidence prior to delivery that materials and components furnished conform to the requirements of the Sections.

4. Written evidence of acceptance of the prepared substrate by the fluid-applied waterproofing manufacturer’s representative.

5. Evidence that the material used in the Work has been manufactured within one year of installation and has, for that entire time, been constantly stored between 50^{o}F and 80^{o}F, and in accordance with the manufacturer’s written recommendations.

C. Certificates, ELD Testing. Submit for approval the following:

1. Copies of certificates stating that the testing agency and type of testing has been approved by the fluid-applied waterproofing manufacturer.

2. Evidence of testing agency’s experience for similar projects.

D. Contractor's Review: Contractor shall submit to Engineer a written statement as specified. Show by copy of transmittal form that a copy of the statement has been transmitted to the manufacturer.

E. Statement of Application: Contractor shall submit to Engineer a written statement as specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver materials in fluid-applied waterproofing manufacturer's original, unopened and undamaged containers, with information accurately representing container contents as approved by Engineer at time of Shop Drawing submission.

2. Include the following information on the label:

a. Name of material and supplier.

b. Installation, handling and protection requirements.

3. Deliver materials in sufficient quantities to allow uninterrupted continuity of the Work.

B. Storage of Materials:

1. Store materials in original, undamaged containers with manufacturer's labels and seals intact.

2. Store all materials in a dry, enclosed area, off the ground and away from all possible contact with water and in a location where temperature can be constantly maintained between 60 F and 75 F and out of direct sunlight.

3. Prevent damage to materials during storage primarily by minimizing the amount of time they are stored at the job-site before being incorporated into construction systems.

C. Handling of Materials:

1. Do not handle, open or mix component materials unless fluid-applied waterproofing can be properly handled as recommended by the manufacturer of the fluid-applied waterproofing.

2. Do not open containers, or expose materials to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the site and shall not be incorporated into the Work.

3. Handle materials carefully and in a manner which prevents contamination and inclusion of foreign materials.

4. Do not open packages or containers until all necessary preparatory Work is complete, approved and installation will begin immediately. Do not allow materials to become wet or soiled or covered with ice or snow.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Product and Manufacturer: Provide the following Basis-of-Design product:

1. LM-60H Fluid-Applied Waterproofing System as manufactured by:

a. Gaco Western, Incorporated, Waukesha, WI.

b. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Fluid-Applied Waterproofing Basis-of-Design System:

1. Polyurethane Elastomeric Membrane: Provide liquid applied materials that comply with the following physical properties and have received NSF 61 approval:

a. Tensile Strength, ASTM D412: 240 psi.

b. Elongation at Break, ASTM D412: 300% at 75°F

c. Hardness, Shore Type A, Durometer 30 ASTM D2240.

d. Low Temperature Brittleness, ASTM D746: Passed @ minus 50°F.

e. Water Vapor Permeability, ASTM E96: 0.02 perm inches.

f. Tear Resistance, ASTM D624: 30 pounds per lineal inch.

2. Polyester mesh tape

a. Gacoflex 66S, or Manufacturer's recommended, 4" wide roll reinforcing fabric tape embedded in liquid flashing.

b. Provide three-course flashing application; fabric tape with waterproofing layer top and bottom all on cleaned and primed surface.

3. Primer:

a. GacoFlex E5691 three-component epoxy primer/sealer or as recommended by manufacturer.

4. Protection Board:

a. Gacopoly DMLTPS-4X50 Light Traffic Mat or as recommended by manufacturer.

b. Thickness: 0.40 inch.

5. Stone Ballast:

a. Provide 3 inches to 4 inches depth of Nominal 1 1/2 inch rounded washed river bottom stone.

b. Provide size #4 aggregate (3/4 inch to 1 1/2 inch) per ASTM D 448 with 85 percent retained on a 3/4 inch screen.

c. Stone ballast to cover all parts of waterproofing and protection board including edge flashings, leave no waterproofing material exposed.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certify that the completed fluid-applied waterproofing Work is in accordance with the Sections and is waterproof, of uniform thickness and without gaps, holidays or pinholes, and tested, at the time of Final Acceptance.

B. Shop Tests not in scope.

C. Provide ELD Testing of finished waterproofing by a qualified testing company as described herein.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. The Contractor shall examine the surfaces to receive the trowel-applied waterproofing, and the conditions under which the trowel-applied waterproofing Work is to be performed, and notify Engineer in writing of all conditions detrimental to the proper and timely completion of the Work and the performance of the fluid-applied waterproofing systems. Do not proceed with the fluid-applied waterproofing Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Preparation

1. Provide cast-in-place concrete free from voids and sharp projections before placing any fluid-applied waterproofing system. Comply with the manufacturer's instructions for the preparation of the substrates to receive the waterproofing system unless more stringent conditions are specified.

2. Test substrate for moisture in accordance with ASTM D4263. Where substrate indicates moisture content above manufacturer’s recommended limit, use appropriate drying methods, and retest. If, after retesting, substrate continues to contain moisture above manufacturer’s recommended maximum, provide continuous barrier coat material, at no additional expense to DEP.

3. Remove surface irregularities on cast-in-place concrete and fill all holes, honeycombs, spalls and cracks using manufacturer's recommended joint seal parging. Repair areas of unacceptable consolidation. Where necessary to remove sharp projections, grind concrete surfaces.

4. Abrasive Blast Cleaning:

   a. Clean the substrate of dust, debris and other substances detrimental to the Work. Remove grease, oil and other contaminants from surfaces of cast-in-place concrete.

   b. Provide abrasive blast cleaning in compliance with ASTM D4258 and ASTM D4259 - Abrasive Blast Cleaning Procedure for all surfaces to receive the Work of this Section to provide a surface profile acceptable to the fluid-applied waterproofing manufacturer for maximum adhesion.

   c. Vacuum cleaning: Follow abrasive blast by broom cleaning all surfaces followed by vacuum cleaning using vacuum cleaners equipped with high-efficiency particulate air filters. Remove all dust, loose stones and debris.

5. Parge all construction joints to a minimum depth of 1/8 inch and 3 inch minimum width using manufacturer's recommended joint seal parging.

6. Seal all through wall projections using waterproofing manufacturer’s recommended sealants.

7. Prime the substrate with a seal coat if recommended by the manufacturer.

8. Verify in writing with the Engineer that substrate conditions are acceptable to receive waterproofing applications.

9. Preparation at areas of existing waterproofing:

   a. Remove existing waterproofing to a point where waterproofing is sound and fully adhered.

   b. Prepare existing substrate for new waterproofing according to manufacturer’s requirements.

   c. Technical Representative to inspect preparation and advise on connection to and overlap onto existing waterproofing. Provide a minimum 6 inch width flashed overlap.

   d. Complete the work under supervision of Technical Representative and test the completed installation per Field Testing section.

3.02 INSTALLATION

A. Comply with manufacturer's instructions for the application of fluid-applied waterproofing, including priming, membrane flashing, and curing.

1. Provide trowel application, do not spray.

2. Start the application only in the presence of the manufacturer's technical representative.

3. Mark slabs in 100 square foot areas to indicate extent of one application kit coverage. Do not exceed recommended coverage rate of 100 square feet per four gallon kit. Provide Engineer with calculations indicating compliance with maximum coverage rate. Coverage rate is based on uniformly prepared substrate as acceptable to installer. Provide additional material at no additional expense to DEP as may be required by substrate accepted by installer.

B. Apply fluid-applied waterproofing using notched or mason's trowel and in accordance with manufacturer's written instructions. Apply in one coat to obtain total uniform, continuous thickness of 150 mil DFT. Engineer should be aware this is about ten (10) gallons (one application kit) per one hundred (100) square feet of surface area. Consult manufacturer's Technical Representative for recommendations on applying a second coat of material as may be required to achieve minimum required thickness on all areas of fluid-applied waterproofing.

C. Install three-course flashings.

D. Test completed waterproofing, see Field Testing.

E. Install Protection Board.

F. Install Ballast.

3.03 FIELD TESTING / QUALITY CONTROL

A. All components of the fluid-applied waterproofing system shall be tested and accepted before placing any other materials.

B. Provide high voltage ELD (electronic leak detection) testing. ELD testing to consist of the following:

1. Brush electrode high voltage sweep over surface of finished waterproofing.

2. Grounding thru reinforcing in the concrete.

3. Testing of dry surface.

4. Direct detection of deficient area, with immediate repair and retesting.

5. Testing service to be provided by Atlantic Testing Services, Marlboro, NJ or comparable.

6. Provide written report by testing company.

C. Thickness: Inspect waterproofing for compliance with manufacturer's required thickness in all areas.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Do not allow construction traffic which is not associated with the installation of the fluid-applied waterproofing and related materials in the area of Work. Protect the area from access by other installers and Contractors until the Work of this Section has been incorporated into finished construction systems.

B. Protect other Work from spillage of waterproofing materials, and prevent materials from entering and clogging drains and conductors. Replace or restore other Work which is soiled or otherwise damaged by the performance of the waterproofing and associated Work.

C. System components which are dislodged, damaged, or penetrated by subsequent installation operations or damaged by detrimental conditions shall be immediately replaced with undamaged material in compliance with the Sections and properly protected as specified.

D. Upon completion of the Work the installer shall advise Contractor of recommended procedures for his surveillance and protection of the waterproofing Work during the remainder of the construction period. At the end of the construction period, or at a time when the remaining construction work will in no way affect or endanger the waterproofing Work, the installer and Technical Representative shall make a final inspection of fluid-applied waterproofing and prepare a written report to Contractor with copy to DEP and Engineer of deterioration or damage found in the Work.

E. Only the installer shall repair or replace deteriorated or defective Work found at the time of final inspection. Only the installer shall be engaged by Contractor to repair damages to the waterproofing Work which occurred subsequent to fluid-applied waterproofing installation and prior to final inspection. Repair or replace the Work so that there will be no question as to the waterproof condition of fluid-applied waterproofing and associated Work at the time of Final Acceptance.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07 62 00 – SHEET METAL FLASHING AND TRIM
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the general requirements for sheet metal flashing for a complete watertight installation complying with all governing codes and standards.

B. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown on the Contract Drawings, specified herein or required otherwise for a complete installation.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 07 90 00 – Joint Protection

1.04 REFERENCES

A. NYSBC – New York State Building Code

B. ASTM A666 – Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

C. ASTM B32 – Standard Specification for Solder Metal

D. FM 1-49 – FM Global Property Loss Prevention Data Sheet, Perimeter Flashing

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association, Incorporated, Architectural Sheet Metal Manual

1.05 DESCRIPTION

A. Sheet metal flashing and trim to be provided under this Section shall include complete systems of flashing; interlocking, mechanically-keyed, 3-way ribbed stainless steel metal masonry flashing.

B. Installation of the systems shall meet the requirements of FM Approval Rating Class 1-90 construction, without relying upon sealants or other non-metallic detailing and fabricating techniques to achieve weather- and water tightness.

C. Performance Criteria:

1. Sheet metal flashing and trim shall be permanently watertight, and not deteriorate in excess of manufacturers' published limitations.

2. Comply with fabrication details recommended by SMACNA and the sheet metal flashing and trim manufacturers, as approved by Engineer at time of Shop Drawing submission.

3. Provide completely watertight metal flashing systems. Contractor shall provide only the highest quality materials and methods of construction and installation as recommended by sheet metal flashing and trim manufacturers in compliance with governing authorities and as approved by Engineer at time of Shop Drawing submission.

D. Sustainable Design Requirements

1. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content shall not be less than 25 percent.

2. Low Emitting Materials: All adhesives and sealants used onsite and within the building's weatherproofing system shall meet the VOC content limits for the work as specified in the Contract Documents.

E. Project-specific system/design requirements will be provided (if necessary) in the Contract in order to update the requirements given herein or to supplement other requirements given in the Contract Drawings.

F. Scheduling:

1. Coordinate ribbed metal cavity wall flashings with other Work to ensure secure anchorage and watertight seals.

2. Deliver materials to the site in sufficient quantities to ensure uninterrupted progress of the Work.

3. Do not proceed with the sheet metal flashing Work until substrate construction, blocking, and other construction to receive the Work is completed.

4. Schedule the installation of sheet metal flashing Work to coincide with the installation Work of other trades.

5. Proceed with and complete the work only when materials, equipment and knowledgeable tradesmen required for the installation of sheet metal flashing systems are at the site and are ready to follow and integrate the work of this Section with work requiring the installation of sheet metal flashing and trim.

1.06 QUALITY ASSURANCE

A. Engage installers skilled, trained and with successful experience in the detailing, fabrication and installation of each type of sheet metal flashing work required who are recognized sheet metal contractors, equipped to perform workmanship in accordance with the Contract Documents and approved Shop Drawings so that there will be undivided responsibility for the performance of each flashing component of the work.

1.07 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval:

1. Installer Qualifications: Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owners, architects or engineers, responsible for the projects.

b. Approximate contract prices for sheet metal flashing.

c. Size of area installed

2. Samples:

a. Typical examples of sheet metal flashing profiles, 12-inches long with all fasteners, clips, and supports required for the Work. 12-

inch by 12-inch sheet of each item specified and 6-inch long pieces of each required system component to be used in the work.

b. Each fastener type required marked as to type of material and with their intended purpose in the work.

3. Shop Drawings:

a. Copies of manufacturers' specifications, installation instructions and recommendations for sheet metal flashing and trim requirements.

b. Manufacturer's data substantiating that the materials comply with the requirements.

c. Detailed Shop Drawings showing all profiles of sheet metal flashing to be used in the work, fully dimensioned, located, quantified and presented such that sequence of installation is acceptable to each interfacing material supplier.

B. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Recycled Content. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

C. Percentage (by weight) of post-consumer and pre-consumer recycled content in the submitted product(s), if applicable.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver materials in manufacturers' original, unopened and undamaged containers and rolls, with labels intact and legible and with information accurately representing container contents as approved by Engineer at time of Shop Drawing submission.

2. Items delivered in broken, damaged, rusted, or unlabeled condition shall immediately be removed from project site and not offered again for approval by Engineer.

B. Storage of Materials:

1. Store materials in an area protected from all construction traffic not associated with the work of this Section.

2. Store materials off the ground and in same package in which they were shipped, and on platforms protected from dirt and other contamination.

3. Store under cover and in a manner which does not permit water to remain on units.

C. Handling of Materials:

1. Protect all sheet metal flashing work from dents, scratches, warps and bends.

2. Immediately after installation of each system component, remove all strippable protective films.

3. Comply with manufacturer's instructions for handling and installation of flashing materials, except where more stringent requirements are shown or specified.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Through-Wall Ribbed Sheet Metal Flashing (Stainless Steel):

1. Cheney Flashing Company, Inc.; Cheney Flashing – Trenton, NJ.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Interlocking Mechanically-Keyed, Ribbed Stainless Steel Flashing Associated with Concrete Work.

1. Provide deformed sheet, stainless steel, Type 316 complying with ASTM A666 for all Work with No. 2D finish.

2. Provide flashing with a mechanically-keyed, 3-way saw tooth design, which bonds in all directions and which has weep holes drainage at 3-inch intervals.

3. Provide a complete system of interlocking, mechanically-keyed components all by the same manufacturer.

4. Thickness: Provide thickness of 26 gauge (0.018-inches).

B. Miscellaneous Materials:

1. Stainless Welding Rods: Type recommended by stainless steel sheet manufacturer for the type of metal sheets furnished.

2. Nails, Screws and Rivets: Same material as flashing sheet, or as recommended by manufacturer of flashing sheet.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabricated Metal Flashing: Shop fabricate sheet metal flashing and trim to comply with profiles and sizes shown, and to comply with manufacturer's recommended details. Except as otherwise shown or specified, provide flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. The Contractor shall examine the substrate and the conditions under which the sheet metal flashing and trim Work is to be performed, and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Preparation

1. Clean the substrate of dust, debris, substances and interferences detrimental to the Work and prepare substrates as recommended by the sheet metal manufacturer.

3.02 INSTALLATION

A. General:

1. Separate dissimilar metals from substrates and from each other by painting each metal surface in the area of contact with a 15-mil thick application of bituminous coating, as recommended by the manufacturers of the dissimilar metals. Comply with manufacturer's recommendations for other forms of protection of the stainless steel and aluminum against corrosion.

2. Provide thermal expansion for running trim, flashing and other items exposed for more than 15 feet - 0 inch continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams at 15 feet - 0 inch intervals, and 2 feet - 0 inch each side of corners and intersections.

3. Fabricate and install the work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks, considering the temper and reflectivity of the metal. Provide uniform, neat double-locked seams with cleats rolled into the seam and with minimum exposure of sealant. Except as otherwise shown, fold back the sheet metal to form a hem on the concealed side of exposed edges. All exposed edges of all sheet metal flashing shall be hemmed not less than 1/2-inch wide.

4. Conceal fasteners and expansion provisions wherever possible in exposed work, and locate so as to minimize the possibility of leakage. Cover and seal work as required for a watertight installation.

B. Installation of Ribbed Metal Flashing:

1. Build ribbed metal masonry flashing work into construction as work progresses. Work performed without built-in flashings shall be stopped, removed and rebuilt at no additional expense to DEP, even if discovered only after walls and other materials are in-place and completed.

2. Install all flashings in a split bed of mortar, increasing the thickness of the bed if required to achieve full mortar coverage on top and bottom of flashings.

3. Coordinate the installation of flashing materials and associated work so as to provide a complete system complying with the combined recommendations of manufacturers and installers involved in the work.

4. Use only installation techniques approved by the ribbed metal flashing manufacturer

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Provide continuous protection of metal flashing materials against wetting, contamination and other damage primarily by storing materials under cover and above ground and away from all construction traffic.

B. Do not permit workmen, or others, to step directly on flashing sheets in place, or to place or move equipment over flashing surfaces. Protect surfaces during installation of permanent covering work and adjoining work.

C. Clean exposed surfaces of every substance which is visible or might cause corrosion or prevent uniform oxidation of the metal surfaces.

D. Do not leave metal debris and discarded materials at the Site of the Work. Clean each site of the work as the work progresses on a daily basis.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the general requirements for caulking and sealant systems for openings and joints in building roofs and walls between concrete-in-place, masonry units, metal roof flashing, and other equipment and structures in order to provide a positive barrier against the passage of air and moisture.

B. Complete technical services from the approved caulking and sealant manufacturers and on-site technical representation by their Technical Representatives during the time of delivery, storage and installation of the work of this Section and during other work which may affect the work of this Section as specified herein is also included.

C. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown on the Contract Drawings, specified herein or required otherwise for a complete job.

D. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	9
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used.

1.04 REFERENCES

A. NYCBC – New York City Building Code

B. ASTM C510 – Staining and Color Change of Single or Multi component Joint Sealers, Standard Test Method for

C. ASTM C661 – Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer, Standard Test Method for

D. ASTM C793 – Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants, Standard Test Method for

E. ASTM C794 – Adhesion-in-Peel of Elastomeric Joints Sealants, Standard Test Method for

F. ASTM C920 – Elastomeric Joint Sealants, Standard Specification for

G. ASTM C1247 – Durability of Sealants Exposed To Continuous Immersion In Liquids, Standard Test Method for

1.05 DESCRIPTION

A. System Design Requirements

1. The caulking and sealant systems to be furnished under the work of this Section shall include two-part elastomeric sealants, components, accessories and miscellaneous materials used for sealing joints in horizontal and vertical planes.

2. The Work shall include but is not limited to:

a. All joints between cast-in-place concrete and masonry;

b. All cast-in-place concrete to cast-in-place concrete expansion joints, except those on the concrete spillway (see Division 3 – Concrete for treatment of spillway concrete joints);

c. All joints between masonry and metal;

d. All control joints in masonry and concrete;

e. All isolation joints between equipment and other items; and

f. Joints were construction systems are discontinuous or inherently non-watertight.

3. The Work shall be performed at all locations whether or not indicated required to render the building watertight except where a construction system is specifically specified or shown as not relying upon the use of sealants in order to achieve weather- and water tightness.

4. Fire Rating:

a. Where caulking and sealant systems are applied within a fire rated room, corridor, egress path, and as indicated in the Contract Drawings, those caulking and sealant systems shall maintain the fire rating of the location in which application is being done.

B. Substitutions

1. Do not change products, system components, colors or manufacturers after Shop Drawing and Samples approvals by Engineer.

2. Clearly identify, in a manner which is highlighted to Engineer, all proposed substitutions, modifications, variations, unspecified features and "or equal" products. Provide complete comparative data with specified products at time of Shop Drawing submission.

C. Sustainable Design Requirements

1. Low Emitting Materials: Sealants and sealant primers used on site and within the building's weatherproofing system shall comply with the following limits for VOC content:

a. Architectural Sealants: 250 g/L.

b. Sealant Primers for Nonporous Substrates: 250 g/L.

c. Sealant Primers for Porous Substrates: 775 g/L.

1.06 QUALITY ASSURANCE

1. Engage a single manufacturer who shall provide the services of a Technical Representative who shall assist Contractor and Engineer by providing technical opinions on the adequacy of materials and methods of installation based on Shop Drawings approved by Engineer.

a. Provide such services during the time of delivery, storage, handling and installation of all caulking and sealant system components.

2. Test caulking and sealants for compatibility with the substrates specified for conformance to current industry standards, and recommend remedial procedures as required.

B. Installer Qualifications: Engage a single installer skilled, trained and with successful experience in the application of the types of material required and who agrees to employ only tradesmen with specific skill and successful experience in this type of work.

C. Performance Criteria: Do not provide exposed caulking and sealant work for metal batten roofing, sheet metal flashing and trim or custom preformed metal

siding work in order to render the work watertight. These construction systems shall be detailed, fabricated and provided such that they are inherently watertight without the use of additional caulking, sealant, elastomeric compounds, asphaltic compounds or other similar materials.

D. Compatibility: Before purchase of each specified sealant, investigate its compatibility with the joint surfaces, joint fillers and other materials in the joint system. Provide only materials (manufacturer's recommended variation of the specified materials) which are known to be fully compatible with the actual installation condition, as shown by manufacturer's published data or certification.

1.07 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval.

1. Samples:

a. Actual cured material samples of each type of caulking and sealant specified, 4-inches long, in each of the manufacturer's standard colors.

b. Samples will be reviewed by Engineer for color and texture only.

c. Compliance with other requirements is the responsibility of Contractor.

B. Shop Drawings:

1. Copies of manufacturer's specifications, recommendations and installation instructions for each type of sealant, caulking compound and associated miscellaneous material required. Include manufacturer's published data, indicating that each material complies with the requirements and is intended for the applications shown.

2. Test Reports:

a. Compatibility tests for substrates, based on adhesion-in-peel standard test procedures and ASTM C920.

b. Copies of certified laboratory test reports indicating conformance with the requirements specified.

3. Guarantee:

a. Copies of written guarantee agreeing to repair or replace sealants which fail to perform as specified.

4. Sustainable Design Submittals:

a. Environmental Materials Reporting Form (EMRF) Recycled Content. Provide the following information:

1) Name of Product and Manufacturer.

2) Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

3) The percentage (by weight) of post-consumer and pre-consumer recycled content in the submitted product(s), if applicable.

5. VOC Reporting Form.

a. For all sealants and sealant primers used on site and within the building's weatherproofing system, provide the VOC content in grams/Liter (g/L) less water and other exempt compounds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver materials in caulking and sealant manufacturer's original unopened and undamaged containers, with information accurately representing container contents as approved by Engineer at time of Shop Drawing and Samples submissions.

2. Include the following information on the label:

a. Name of material and supplier.

b. Formula or specification number, lot number, color and date of manufactures.

c. Mixing instructions, shelf life and curing time when applicable.

3. Failure to comply with these requirements shall be sufficient cause for rejection of the material in question, by Engineer, and his requiring its removal from the site. Supply new material conforming to the specified requirements at no additional expense to the City.

B. Storage of Materials:

1. Store materials so as to preclude foreign materials.

2. Do not store or expose materials to temperature above 90 F or store in direct sunshine.

3. Do not use materials which are outdated as indicated by shelf life.

4. Store sealant tape in a manner which will not deform the tape.

5. In cool or cold weather store containers where temperature approximates 75°F for 16 hours before using.

6. When high temperatures prevail store mixed sealants in a cool place.

C. Handling:

1. Handle materials carefully to prevent inclusion of foreign materials.

2. Do not open containers or mix components until necessary preparatory work and priming has been completed.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Exterior and Interior Joints in Vertical Planes: Provide one of the following:

1. Dymeric 240FC as manufactured by Tremco Incorporated, an RPM Company, Beachwood, OH.

2. Sikaflex-2C NS as manufactured by Sika Corporation, Lindhurst, NJ.

3. Or approved equal.

B. Exterior and Interior Joints in Horizontal Planes: Provide one of the following:

1. THC 900/ 901 as manufactured by Tremco Incorporated, an RPM Company, Beachwood, OH.

2. Sikaflex-2C SL as manufactured by Sika Corporation, Lindhurst, NJ.

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Exterior and Interior Joints in Vertical Planes:

1. Urethane-based, two-component elastomeric sealant complying with the following:

a. ASTM C 920 Adhesion-in-Peel, ASTM C 920and ASTM C794: Minimum 10 lbs/linear inch with no adhesion failure.

b. Hardness (Standard Conditions), ASTM C661: 20-25 (Shore A).

c. Stain and color change, ASTM C 920 and ASTM C510: No discoloration or stain.

d. Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weather meter.

e. Rheological Vertical Displacement at 120 F, ASTM C 920: No sag.

B. Exterior and Interior Joints in Horizontal Planes:

1. Polyurethane-based, two-component elastomeric sealant complying with the following:
   a. ASTM C 920Water Immersion Bond, ASTM C1247: Elongation of 25% with no adhesive failure.
   b. Hardness (Standard Conditions), ASTM C661: 30-40.
   c. Stain and Color Change, ASTM C1247 and ASTM C510: No discoloration or stain.
   d. Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weather meter.

C. Provide colors selected by Engineer from caulking and sealant manufacturer's standard color charts. Engineer will select a maximum of ten colors for the Work. Manufacturers supplying sealants other than those specified above must provide the same colors available from those specified.

D. Miscellaneous Materials:

1. Joint Cleaner: Provide the type of joint cleaning compound recommended by the sealant and caulking manufacturer, for the joint surfaces to be cleaned.
2. Joint Primer and Sealer: Provide the type of joint primer and sealer recommended by the caulking and sealant manufacturer, for the joint surfaces to be primed or sealed.
3. Bond Breaker Type: Polyethylene tape or other plastic tape as recommended by the caulking and sealant manufacturer, to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of caulking and sealant. Provide self-adhesive tape wherever applicable.
4. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non absorptive material as recommended for compatibility with caulking and sealant by the caulking and sealant manufacturer. Provide size and shape of rod which will control the joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
5. Low Temperature Catalyst: Provide the type recommended by the caulking and sealant manufacturer.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Mixing

1. Comply with sealant manufacturer's written instructions for mixing 2-component sealants.

2. Thoroughly mix components before use.

3. Add entire contents of activator can to base containers. Do not mix partial units.

4. Mix contents for a minimum of 5 minutes or as recommended by the sealant manufacturer, until color and consistency are uniform.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. The Contractor shall examine the joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and the conditions under which the caulking and sealant work is to be performed, and notify Engineer in writing of any condition detrimental to the proper and timely completion of the Work and the performance of the sealant systems. Do not proceed with the caulking and sealant work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Joint Surface Preparation

1. Clean joint surfaces immediately before installation of sealant compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bonds of sealant compound as recommended by sealant manufacturer's written instructions.

2. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's written instructions indicate that alkalinity does not interfere with sealant bond and performance.

   a. Etch with 5 percent solution of muriatic acid.

   b. Neutralize with dilute ammonia solution.

   c. Rinse thoroughly with water and allow to dry before sealant installation.

3. If necessary, clean porous materials such as concrete and masonry by grinding, abrasive blasting or mechanical abrading. Blow out joints with oil-free compressed air, or by vacuuming joints prior to application of primer or sealant.

4. Roughen joint surfaces on vitreous coated and similar non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or wool to produce a dull sheen.

3.02 INSTALLATION

A. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

B. Prime or seal the joint surfaces wherever recommended by the sealant manufacturer. Do not allow prime or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to application of sealants.

C. Apply masking tape before installation of primer, in continuous strips in alignment with the joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.

D. Do not install sealants without backer rods or bond breaker tape.

E. Roll the back-up rod stock into the joint to avoid lengthwise stretching. Do not twist, braid, puncture or prime backer-rods.

F. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

G. Install sealants to depths as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead.

1. For horizontal joints in sidewalks, pavements and similar locations sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but not more than 5/8-inch deep or less than 3/8-inch deep.

2. For vertical joints subjected to normal movement and sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep or less than 1/4-inch deep.

A. Project Conditions / Environmental Conditions:

1. Do not proceed with installation of caulking and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.

2. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

3. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that

sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.

4. When high temperatures prevail avoid mixing sealants in direct sunlight.

B. Remove excess and spillage of compounds promptly as the Work progresses.

C. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

3.03 FIELD TESTING / QUALITY CONTROL

A. Where questions of compatibility of sealants and substrate arise the sealant manufacturer shall test the substrate in question for compatibility with the specified sealant and report his findings, with recommendations, to Engineer. Any required sealant change shall be at no additional expense to the City.

B. Do not proceed with installation of elastomeric sealants over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with Paragraph 4.3.9 of ASTM C 920 has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed, or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

C. After nominal cure of exterior joint sealants which are exposed to the weather, test for water leaks. Flood the joint exposure with water directed from a 3/4-inch garden hose, without nozzle, held perpendicular to wall face, 2 feet-0 inch from joint and connected to a water system with 30 pounds per square inch minimum normal water pressure. Move stream of water along joint at an approximate rate of 20 feet per minute.

D. Test approximately 5 percent of total joint system, in locations which are typical of every joint condition, and which can be inspected easily for leakage on opposite face. Conduct test in the presence of Engineer, who will determine the actual percentage of joints to be tested and the actual period of exposure to water from the hose, based upon the extent of observed leakage, or lack thereof.

E. Where nature of observed leakage indicates the possibility of inadequate joint bond strength, Engineer may direct that additional testing be performed at a time when joints have been fully cured, followed by natural exposure through both extreme temperatures and returned to the lowest range of temperature in which it is feasible to conduct testing. Perform testing as directed at any time within 24 months of installation date.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection: Do not allow caulking and sealants to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces including rough

textured materials. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the caulking and sealant materials.

B. Repair sealant installation at leaks or, if leakage is excessive, replace sealant installation as directed.

C. Clean adjacent surfaces of sealant or soiling resulting from the Work. Use solvent or cleaning agent recommended by the sealant manufacturer. Leave all finish work in a neat clean condition.

D. Protect the sealants during the construction period so that they will be without deterioration, soiling, or damage at the time of the City's Final Acceptance.

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Waterproof doors shall be provided complete with all accessories and fastenings required for a complete satisfactory installation

B. An index of the Articles in this Section is given below for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. American Society of Testing Materials (ASTM):

1. ASTM A 36 – Standard Specification for Carbon Structural Steel.

2. ASTM A 167 – Standard Specification for Stainless and Heat- Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

3. ASTM A 211 – Specification for Spiral-Welded Steel or Iron Pipe.

4. ASTM A 276 – Standard Specification for Stainless Steel Bars and Shapes.
5. ASTM A 304 – Standard Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements.
6. ASTM A 316 – Specification for Low-Alloy Steel Covered Filler Metal Arc-Welding Electrodes.
7. ASTM A 366 – Standard Specification for Commercial Steel (CS) Sheet, Carbon (0.15 Maximum Percent) Cold Rolled.
8. ASTM A 500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A 513 – Standard Specification for Electric-Resistance- Welded Carbon and Alloy Steel Mechanical Tubing
10. ASTM A 569 – Standard Specification for Steel, Carbon (O. 15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
11. ASTM A 276 – Standard Specification for Stainless Steel Bars and Shapes.
12. ASTM B 26 – Standard Specification for Aluminum-Alloy Sand Castings.
13. ASTM B 209 – StandardSpecification for Aluminum and Aluminum Alloy Sheet Plate.
14. ASTM B 211 – StandardSpecification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
15. ASTM A 500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

B. ANSI/FM 2510 – American National Standard for Flood Mitigation Equipment.

C. FEMA Technical Bulletin 3-93 – Non-Residential Flood Proofing.

D. SEI/ASCE 7-02 – Minimum Design Loads for Buildings and Other Structures.

E. SEI/ASCE 24 Flood Resistant Design and Construction.

F. AWS D1.1 – Structural Welding Code - Steel.

G. AWS D1.6 – Structural Welding Code - Stainless Steel.

H. Aluminum Structures – A Guide to Their Specifications and Design.

I. U.S. Army Corps of Engineers, EP 1165-2-314 – Flood Proofing Regulations, 15 December 1995.

J. ASME Section VIII Division 1. of Appendix 8 – Methods for Liquid Penetrant.

1.05 DESCRIPTION

A. Watertight doors shall be designed to perform under hydrostatic loads to control short-term load pressures indicated. All water pressure loads, and operating loads shall be transferred to the building structure. Loading on the watertight

doors shall be as required by the Contract Documents and conform to the following:

1. Standard loading: Standard Flood Doors shall be designed for hydrostatic loading, and have no additional allowances included for hydrodynamic loads, wave loads or debris impact loads.

B. Design Safety Factor for all watertight door Flood Door Models of a minimum 2:1. Based on material ultimate yield strengths.

C. Design Safety Factor for Anchors shall be minimum of 4:1 for cast-in-place concrete, or minimum of 6:1 for concrete masonry unit construction.

D. Designs loads shall be in accordance to FEMA Technical Bulletin 3-93 - Non-Residential Flood Proofing and SEI/ASCE 24 Flood Resistant Design and Construction requirements.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual inspection of welding, as per applicable welding code if applicable.

c. Perform visual and dimensional inspection of completed work.

B. Manufacturer Qualifications: The manufacturer shall demonstrate a minimum of five years successful experience in the design and manufacture of similar flood related closures. Upon request, provide supporting documentation including list of installations, descriptions, name and contact information.

C. Welder Qualifications: Welders Certified in accordance with American Welding Society Procedures: AWS-1-GMAW-S, WPS No. B2.004.90 for applicable material used in production of specified product.

1.07 SUBMITTALS

A. The Contractor shall prepare and submit to the Engineer for approval, shop drawings and other material required to substantiate conformance to Contract Documents.

B. Shop drawings shall be sealed and signed by a New York State Registered Professional Engineer.

C. Submittal drawings shall include, but not limited to, the following:

1. General layout drawings showing overall frame dimensions, opening at the base of the frame, clear opening size, thickness of the frame and the overall height of the frame.

2. Layout drawings shall indicate all structural shapes, sizes and dimensions.

3. Certifications, schedules, design calculations, detailed drawings, plans, elevations, and details of sections and connections. Design calculations shall clearly indicate the loads imposed from the flood door to the existing construction.

4. Detailed drawings shall indicate jointing and anchoring details.

5. Anchor bolts and setting plans.

6. Erection drawings.

D. No Work shall be performed or equipment installed without a "Furnish as Submitted" or "Furnish as Corrected" drawing or Submittal.

E. The following shall also be submitted:

1. Design calculations sealed and signed by a New York State Registered Professional Engineer, to verify the waterproof door's ability to withstand the design pressure loading.

2. The manufacturer's specifications, load table, installation instructions, setting drawings and templates for location and installation of miscellaneous metal items, appurtenances and anchorage devices.

3. Certified weld inspection reports.

4. Copies of certified materials test reports, both chemical and physical and test report for susceptibility to intergranular corrosion of the stainless steel material, as applicable.

F. Factory Testing Documentation: Furnish independent party witnessed factory testing documentation of the same model/type pedestrian flood door demonstrating a maximum leakage rate of 0.040 gallon per hour per linear foot of wetted perimeter, tested in accordance with the procedure set forth by the American National Standard for Flood Mitigation Equipment in ANSI/FM Approvals 2510 (Year 2020) section 4.3.3 for a minimum of 22 hours. Maximum leakage rate shall be published as the greater of the leakage rates recorded at both 10% and 100% of the maximum test water height. Leakage shall be collected through all portions of the product assembly which are below the test water depth, including hardware and lockset.

G. The following representative material samples shall be furnished: Representative samples of bolts, anchors and inserts as requested by the Engineer. The Engineer's review shall be for type and finish only. Compliance

with all other requirements shall be the exclusive responsibility of the Contractor.

H. Provide Operation and Maintenance Manual to include methods for maintaining installed products, precautions against cleaning materials and methods detrimental to finishes and performance.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in the manufacturer's unopened packaging container with identification labels intact until ready for installation.

B. Protect materials from exposure to moisture.

C. Store materials in a dry, warm, ventilated weathertight location. If outdoor storage is required, block materials to store at an incline, to prevent pooling of any moisture and promote runoff. Tarp materials in a tent-like arrangement, elevated above the product with open sides to allow airflow. Store all other hardware in a dry controlled environment.

D. Use caution when unloading and handling product to avoid bending, denting, crushing, or other damage to the product.

E. Consult shop drawings or consult with factory for proper lift points.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. As a Basis-of-Design provide HYDRO 1 – PD 520 as manufactured by PS Flood Barriers, Grand Forks, ND; or comparable product by any of the following manufacturers:

1. Presray Corporation, Wassaic, NY.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Product Details:

1. Watertight hinged pedestrian flood door with optional raised sill.

2. Sealing Requirements: Flood Door and gasket design shall provide an effective barrier against short-term high-water situations, to the

protection level as shown on the Contract Drawings.

3. Operation: Provide with latching operable from both sides.

4. Door and Frame Material: Stainless Steel Type 316, #4 brushed finish, all welded construction.

5. Gasket Material: Factory mounted, continuous, compressible rubber type, field replaceable. UV resistant EPDM, neoprene and rubber.

6. Threshold: ADA compliant and gasket-free as provided by flood door manufacturer.

7. Operating hardware: See Section 08 71 01 – Finish Door Hardware. Manufacturer's engineering review is required.

8. Mounting/Load Transfer: Anchor to the wet side of the existing structure. Flood Door shall be designed for specified hydrostatic pressure and will transfer loads through bearing to adjacent structure.

9. Frames to be anchored utilizing mechanical, chemical or other anchor types as designed. The manufacturer to include all anchors, water-stop, and sealants, as designed.

10. Loading Direction Selection: Standard - Positive Pressure Loading: (Direction of loading against flood door so as to further compress gaskets against flood door frame-"seating").

11. Provide rectangular door opening with square corners to facilitate easy passage.

12. Provide compression gasket which requires no inflation.

13. Provide two (2) additional sets of compression gaskets for each installation.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. The manufacturer shall have and perform quality control operations based on a written quality control program that includes the following:

1. Review and rejection of incoming materials based on certified test reports and visual inspections.

2. Frequency of inspection and inspection requirements.

3. All quality control inspection reports shall be dated and maintained by the door manufacturer for a minimum period of seven years.

4. All prototype test records for custom hatches and all production test records shall be dated and maintained by the door manufacturer for a minimum period of seven years.

5. All prototype test records for the manufacturer's standard door designs shall be permanently archived.

B. Factory Testing / Quality Control:

1. All welds on steel assemblies that may be potential “leak path” shall be liquid penetrant inspected in accordance with ASME Section VIII Division 1. of Appendix 8 – Methods for Liquid Penetrant.

2. Finished assembly or assembly similar in design shall be factory leak tested to verify that it will withstand the design hydrostatic pressure.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturers for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

B. Coordinate Work with other operations and installation of adjacent materials to avoid damage.

C. The Contractor shall verify that the area to receive the door is properly prepared and set to the proper elevation.

D. Do not begin installation until substrates have been properly prepared.

E. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

F. Install in accordance with manufacturer's installations instructions, approved shop drawings, shipping, handling, and storage instructions, and product carton instructions for installation.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing:

1. Perform visual dry test for gasket alignment, continuity contact and pre-compression.

2. Installer to construct temporary water barrier and test installed watertight door.

B. Products to be operated and field verified including the sealing surfaces to ensure that they maintain contact at the correct sealing points.

C. Verify that hinging and latching assemblies operate freely and correctly.

D. Verify all anchorage is in accordance with manufacture's installation instructions and applicable data sheets.

E. Tolerances: All dimensional requirements must be in accordance with manufacturer's installation instructions and shop drawings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Frames shall be installed level, square, plumb, and rigid.

B. Sealants, water-stop, and grouting to be applied per product application directions and in accordance with manufacturer's instructions.

C. Field grouting to be completed by the Contractor's personnel, and in accordance with product application directions and manufacturer's instructions.

D. Touch-up, repair or replace damaged installed products or components.

E. Clean all sealing surfaces.

F. Protect installed products until completion of project.

END OF SECTION

SECTION 08 71 01 – FINISH DOOR HARDWARE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown, specified or required otherwise for a complete job.

B. Finish hardware is defined to include all items known commercially as finish hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same Section as the door and door frame.

C. Types of finish hardware work required include, but are not necessarily limited to, the following:

1. Mortise locksets
2. Overhead surface-mounted door closers

D. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

E. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	9
PART 3	EXECUTION	9
3.01	Examination / Preparation	9
3.02	Installation	9
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Doors and Hardware Institute

1. Recommended Locations for Architectural Hardware for Doors Installed in Standard Steel Frames
2. Recommended Locations for Architectural Hardware for Doors Installed in Custom Steel Frames

B. South Coast Air Quality Management District (SCAQMD)

1. Rule 1113 -- Architectural Coatings
2. Rule 1168 -- Adhesives and Sealants

C. Green Seal (GS)

1. GS–11 -- Green Seal Standard for Paints and Coatings.
2. GC–03 -- Green Seal Environmental Criteria for Anti-Corrosive Paints.

D. ASTM C920 -- Standard Specification for Elastomeric Joint Sealants

1.05 DESCRIPTION

A. Where the finish, shape, size or function of a member receiving finish hardware is such as to prevent the use of or make unsuitable the types specified, furnish similar types having as nearly as practicable the same operation.

B. Furnish finish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements, as necessary for proper installation and function.

C. Unless otherwise specified, comply with the technical guidance of Door and Hardware Institute (DHI), for locating hardware on standard or customized steel doors and frames, as applicable.

D. Provide stainless steel finish hardware or matching finish hardware as specified for all doors and frames.

E. Sustainable Design Requirements

1. VOC Content: Products applied on site and within the building's weatherproofing system shall comply with VOC limits of authorities having

jurisdiction and the following VOC limits of when calculated according to SCAQMD Rule 1113 and Rule 1168, Green Seal Standard GS–11, Green Seal Criteria GC–03:

a. Architectural Sealants: 250 g/L

b. Sealant Primers for Nonporous Substrates: 250 g/L

c. Sealant Primers for Porous Substrates: 775 g/L

d. Multipurpose Construction Adhesives: 70 g/L

e. Flat Paints and Coatings: VOC not more than 50 g/L

f. Non flat Paints and Coatings: VOC not more than 150 g/L

g. Primers, Sealers, and Under coaters: VOC not more than 200 g/L

h. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.

F. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the finish hardware.

2. Coordinate the work of other Sections in order to provide clearances and accurate positioning of recessed or cast-in-place items required by this Section.

1.06 QUALITY ASSURANCE

A. Supplier Qualifications: The finish hardware supplier shall have in his employ a member of the DHI as a certified Architectural Hardware Consultant who shall be responsible for checking, supervising and preparing written Field Report for complete finish hardware installation and with on-site presence during the time of installation and adjustment of the Work.

B. Requirements of Regulatory Agencies: Comply with the applicable requirements of governing authorities and codes for the types of finish hardware specified.

C. Source Quality Control: Obtain all similar products and accessories from the same manufacturer.

D. Substitutions

1. Clearly identify, in a manner which is highlighted to the Engineer, all proposed substitutions, modifications, variations, unspecified features and "or approved equal" products. Provide complete comparative data, comparing "or approved equal" with specified products, at time of Shop Drawings submission.

E. Do not make substitutions after the Engineer's approval of final finish hardware schedule and sample at time of Shop Drawing submission.

1.07 SUBMITTALS

A. Contractor shall submit the following to the Engineer for review and approval:

1. Actual unit of each finish hardware item specified incorporating all standard and special features and finishes specified, demonstrated and identified by supplier's representative to the Engineer. Samples shall be presented at time of Shop Drawing submittal as the Engineer will not review or approve Shop Drawings without concurrent sample submissions.

2. The Engineer's review will be for general quality and features of units, compliance with all other requirements is the exclusive responsibility of the Contractor.

3. Approved samples may be incorporated into the finish hardware work.

B. Shop Drawings:

1. Copies of manufacturer's data for each item of finish hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installations and for maintenance of operating parts and exposed finishes. Wherever needed, furnish templates to fabricators of other work which is to receive finish hardware.

2. Copies of the finish hardware schedule. Include a separate key schedule, showing clearly how City's final instructions on keying of locks have been fulfilled. Finish hardware schedules are intended for coordination of the Work. Review and acceptance by the Engineer does not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.

3. Based on the finish hardware requirements specified, organize the final finish hardware schedule into "hardware sets," indicating complete designation of every item required for each door or opening. Furnish initial draft of schedule at the earliest possible date, in order to facilitate the fabrication of other work (such as stainless steel frames) which may be critical in the Project construction schedule. Furnish final draft of schedule after samples, manufacturer's data sheets, coordination with Shop Drawings for other work, delivery schedules and similar information have been complete and accepted.

4. Copies of manufacturers' specifications and installation instructions for required materials and components which are not included in other submittal specified in other Sections of this Specifications. Coordinate the requirements of this Section with other submittal and coordinate the submittal of other data in other Sections with the Sections' submittal.

5. Maintenance Manual: Upon completion of the Work, furnish copies of detailed maintenance manuals, including the following information:

a. Product name and manufacturer.

b. Name, address and telephone number of manufacturer and local distributor.

c. Detailed procedure for routine maintenance and cleaning.

d. Detailed procedures for repairs such as dents, scratches and staining.

e. Parts identification manual and maintenance manuals for each piece of finish hardware.

C. Cylinders and Keying System:

1. Provide a great grandmaster keying system.

2. Equip all locks with manufacturer's special 6-pin tumbler cylinder, with construction master key feature, which permits voiding of construction keys without cylinder removal.

3. Comply with Engineer's instructions for master keying and, except as otherwise specified, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.

4. Key Material: Provide keys of nickel silver only.

5. Key Quantity: Furnish 3 keys for each lock and 5 keys for each master and grandmaster system. Provide one extra key blank for each lock.

D. Test Reports: Submit for approval certified laboratory test reports for required performance tests.

E. Finish hardware schedule

F. For all paints, coatings, sealants and adhesives used on site and within the building's weatherproofing system provide the VOC content in grams/liter (g/L) less water and other exempt compounds, if applicable.

G. Written field report on condition of each item of finish hardware actually present on each door at the project site with each item referenced to the approved Shop Drawings. Final approval or final payment shall not be provided to Contractor until field report has been submitted to and approved by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver finish hardware sufficiently in advance of its setting for proper inspection.

2. Pack each piece of finish hardware separately, complete with screws, keying, instructions and templates, tagged to correspond with the approved finish hardware schedule.

3. Deliver individually packaged finish hardware items at the proper time to the proper locations for installation.

B. Storage of Materials:

1. Provide secure lock-up for finish hardware stored at the project site, but not yet installed.
2. Store finish hardware in manufacturers' original packages.

C. Handling of Materials: Control the handling and installation of finish hardware items which are not immediately replaceable, so that the completion of the Work will not be delayed by finish hardware losses, both before and after installation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mortise Lock Sets

1. Heavy-Duty Mortise Lock Set, Newport N9M (ANSI No. 14), by Corbin Russwin, an ASSA ABLOY Group Company.
2. Or an approved equal.

B. Overhead Surface-Mounted Door Closer

1. DC8000 Parallel Arm Mounting Heavy-Duty Non-Hold Open Arm with Stop (DC8210 Series), by Corbin Russwin, an ASSA ABLOY Group Company.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Requirements for All Products

1. Hand of Door: Contract Drawings show the swing or hand of each door leaf (left, right, reverse bevel, etc.). Furnish each item of finish hardware for proper installation and operation of the door swing as shown.
2. Manufacturer's Nameplate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates).
3. Base Metals: Produce finish hardware units of the basic metal and forming method specified, using the manufacturer's standard metal alloy, composition, temper and hardness. Do not substitute materials or forming methods for those specified.

4. Fasteners: Manufacture finish hardware to conform to published templates, generally prepared for machine screw installation. Do not provide finish hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

5. Furnish screws for installation, with each finish hardware item. Provide Phillips flat-head screws except as otherwise specified. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces on other work, to match the finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

6. Provide fasteners which are compatible with both the unit fastened and the substrate, and which will not cause corrosion or deterioration of finish hardware, base material or fastener.

7. Provide concealed fasteners for finish hardware units which are not exposed when the door is closed, except to the extent no standard manufacturer units of the type specified are available with concealed fasteners. Do not use through bolts for installation when the bolt head or the nut on the opposite face is exposed in other work under any condition, except where it is not possible to adequately reinforce the Work and use machine screws or concealed fasteners of another standard type of satisfactorily avoid the use of through bolts.

8. Tools for Maintenance: Furnish a complete set of specialized tools as needed for City's continued adjustment, maintenance, removal and replacement of finish hardware.

B. Heavy-Duty Pivot Hinges

1. Provided by waterproof door manufacturer. See Section 08 03 00 – Waterproof Doors.

C. Mortise Locks Sets

1. Strikes: Provide manufacturer's standard wrought box strike, for each location and use shown. Provide stainless steel curved lip strikes, unless otherwise recommended by manufacturer, finish to match lock or latch set trim.

2. Lock Throw: Provide minimum of 1-inch anti-friction latch bolt and 1-inch dead bolt throw wherever available on manufacturer's functions specified.

3. Materials: Provide the following materials:

   a. Latch Bolt: Stainless steel.

   b. Dead Bolt: Stainless steel.

   c. Case: Stainless steel.

   d. Hub: Nickel steel.

e. Scalp: Stainless steel.

f. Escutcheon: 8-1/2-inches by 1-3/4-inches stainless steel; US 32D; Satin Stainless Steel.

4. Backset: Provide minimum backset of 2-3/4-inches.

5. Finish: Us32d Satin Stainless Steel.

D. Overhead Surface-Mounted Door Closers

1. Provide all doors, unless specially scheduled or specified as being provided with floor mounted or concealed overhead closers, with surface-mounted overhead door closers. Provide both active and inactive door leafs with closers.

2. Size of Units: Except as otherwise specified, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather, and anticipated frequency of use.

3. Where parallel arms are specified, and for closers on exterior doors, provide closer unit one size larger than recommended for use with standard arms.

4. Use parallel arm arrangement for doors that would otherwise have the door closer appearing in finished corridors or entries.

5. Provide corner bracket mounting on exterior doors. Select all arms to clear weatherstripping, and overhead door holders.

6. Provide long arm to allow door to swing 180 degrees where long arm will eliminate floor mounted stops.

7. Provide closers with spring power adjustment feature capable of increasing spring power 15 percent minimum in all closer sizes.

8. Provide individual regulating valves for closing and latching speeds, and separate adjustable backcheck valve.

9. Provide delayed closing action feature on all door closers. Position valve at top of closure.

10. Provide the following materials and features in addition to others specified herein:

a. Full Metal Cover: Aluminum.

b. Case: Cast iron.

c. Arms: Plated to match full metal covers.

d. Other Parts: Steel.

e. Extreme temperature fluid.

f. Security torx machine screws.

g. Ten year warranty.

h. Provide manufacturer's optional corrosion protection.

11. Finishes: S26D Satin Chrome. Color coordinate all arms and other accessories.

E. Thresholds

1. Provided by flood door manufacturer.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. The Contractor, installer and architectural hardware consultant shall examine the substrate to receive finish hardware, and ascertain the conditions under which the work will be performed, and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the finish hardware Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Preparation

1. Templates: Furnish finish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of finish hardware. Upon request, check the Shop Drawings of such other work, to confirm that adequate provisions are made for the proper installation of the finish hardware.

3.02 INSTALLATION

A. Mount finish hardware units at heights recommended in "Recommended Locations for Architectural Hardware" by Door and Hardware Institute, except as otherwise specified or required to comply with governing regulations.

B. Install each finish hardware item in compliance with the manufacturer's instructions and recommendations.

C. Set units level, plumb and true to line and locations. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Cut and fit threshold and floor covers to profile of door frames, and recessed floor mounted closers with mitered corners and hair-line joints. Join units with concealed

welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.

F. Screw thresholds to substrate with No. 10 or larger stainless steel screws of the proper type for permanent anchorage.

G. Set thresholds in a bead of butyl rubber sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant before sealant cures to a firm set.

3.03 FIELD TESTING / QUALITY CONTROL

A. Provide a written field report, prepared by installer's architectural hardware consultant, identifying actual condition, location, manufacturer, and product designation for each item of finish hardware actually present on each door at the Site, including whether finish hardware is adjusted and operating properly. Compare actual units present with each item referenced to the approved Shop Drawings and Contract requirements.

B. Installer's architectural finish hardware consultant shall provide opinions to, and assist the Engineer in determining, acceptability of installation as work proceeds. All comments and discussions, conversations and meetings with the Engineer shall be included in written field report for submission to the Engineer for review and approval at completion of finish hardware installation.

C. As part of written field report to be submitted to the Engineer for approval, recommend remedial actions for work not in compliance with the Sections. No payment for remedial action shall be made until remedial recommendations and actions have been approved by the Engineer and incorporated into the Work.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Provide a Final Report on the actual finish hardware present on each door of the work. Compare this field Report to approved Shop Drawings submittal and present to the Engineer with remedial recommendations. No payment for remedial action shall be made until remedial recommendations have been approved by the Engineer and implemented by the Contractor.

B. Adjust and check each operating item of finish hardware and each door to ensure proper operation or function of every unit. Lubricate moving parts with the type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application.

C. Final Adjustment: Where finish hardware installation is made more than one month prior to Final Acceptance or occupancy of a space or area, return to the Work during the week prior to Final Acceptance or occupancy, and make a final check and adjustment of all finish hardware items in such space or area. Clean and relubricate operating items as necessary to restore proper function and finish of finish hardware

and doors. Adjust door control devices to compensate for final operating of heating and ventilating equipment.

D. Provide each manufacturer's authorized technical representative to instruct and train the City's personnel in proper adjustment and maintenance of finish hardware during the final adjustment of finish hardware.

E. Finish hardware which is blemished or defective will be rejected even though it was set in place before defects were discovered. Remove and replace with new finish hardware. Repair all resultant damage to other work.

F. Continued Maintenance Service: Approximately 6 months after the acceptance of finish hardware in each area, the installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and readjust every item of hardware to restore proper function of doors and finish hardware. Consult with and instruct City's personnel in recommended additions to the maintenance procedure. Clean and lubricate operational items wherever required. Replace finish hardware items which have deteriorated or failed due to faulty design, materials or installation of finish hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the finish hardware.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 08 91 20 – FIXED LOUVERS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, materials, equipment and appliances required for the complete execution of the Work as shown on the Contract Drawings, specified in the Contract, and as specified herein.

B. The extent of louver Work is shown on the Contract Drawings and includes the following:

1. Individual louver openings where indicated.
2. Blank-off metal panels where required.
3. Bird screen or insect screen as required.

C. Remove sections of louver where indicated on the Drawings.

D. The following index of this Section is presented for convenience:

E.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
MAXIMUM WATER PENETRATION		4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 07 90 00 - Joint Protection

1.04 REFERENCES

A. AMCA 500 - Air Movement Control Association (AMCA) Louvers, Dampers, and Shutters, Test Method for

B. AA - The Aluminum Association Incorporated, Aluminum Standards and Data

1.05 DESCRIPTION

A. Structural Performance: Design, engineer, fabricate and install metal louvers to withstand the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames and supports, noise or metal fatigue caused by louver blade rattle or flutter; and permanent damage to fasteners and anchors.

1. Wind Load: Uniform pressure (velocity pressure) of 30 lb. per sq. ft. acting inwards or outwards.

2. Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

a. Temperature Change (Range): 100 deg. f (55.5 deg. C)

B. Air-Performance, Water-Penetration and Air-Leakage Ratings: Provide louvers complying with performance requirements indicated as demonstrated by testing manufacturer's stock units of height and width indicated according to AMCA 500.

1.06 QUALITY ASSURANCE

A. Codes and Standards: All units shall conform to AA - Aluminum Standards and Data, latest edition.

B. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:

   a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

   b. Perform visual inspection of welding, as per applicable welding code if applicable.

   c. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. The following shall be submitted for review and approval by the Engineer.

1. Cut Sheets

2. Samples, including proposed finishes as specified herein

3. Shop Drawings

1.08 DELIVERY, STORAGE, AND HANDLING

A. Brace and support units to prevent deformation during delivery.

B. Factory wrap units with approved materials to protect finish during delivery and storage.

C. Handle units with care to prevent bending or scratching.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The Airolite Co, Schofield, WI

B. Penn Ventilator Co., Inc., Birmingham, AL

C. Airflex Corporation, Farmingdale, NY

D. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Double Drainable Fixed Louver:

1. Individual louver shall be Airflex Industrial Model No. FDD-6-SS or approved equal; fixed 45-degree, 6 inch deep dual drainable storm proof blade of the following characteristics:

a. Frames and blades shall be stainless steel 316 alloy .064" thick.

b. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals which are corrosive or incompatible with materials joined.

1) Use types, gages and lengths to suit unit installation conditions.

2) Use Philips flat-head machine screws for exposed fasteners unless otherwise indicated.

c. Anchors and inserts of type, size and material required for type of loading and installation indicated. Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installation and elsewhere as required for corrosion resistance.

d. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2. Manufacturer to submit test data on 4 feet x 4 feet louver units. Test data shall show the following results at 1100 fpm free area velocity.

Minimum Free Area	Maximum Pressure Drop	**MAXIMUM WATER PENETRATION**
7.32 sq. ft.	0.24 in	0.005 oz.
0.678 m	6.10 mm	1.53 g

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Finish

1. Exposed sides of all stainless steel components shall be Airflex Industrial finish A1221 Glass Bead or approved equal to match finish of window wall system, as per the approved submittal of the finish sample.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Anchor louver frames using stainless steel bolts into holes drilled and tapped in sub-frames or with strap anchors to masonry in accordance with the manufacturer's approved directions.

B. Isolate aluminum from contact with masonry or dissimilar metals with heavy coat of bituminous paint or neoprene gaskets.

C. Mount bird screens of all louvers unless indicated otherwise on inside face with clips, machine screw into frames. Screws shall be stainless steel.

D. Verify size, location and placement of continuous louvers and individual louver units prior to fabrication wherever possible. Coordinate field measurement and shop assembly to minimize field adjustment. It is important to recognize that both fabrication and installation be done by the same company in order to achieve the quality required.

E. Locate and place louver unit's plumb, level and in proper alignment.

F. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

G. Form closely fitted joints with exposed connections accurately located and secured.

H. Provide perimeter reveals and openings of uniform width for sealants and joint fillers as indicated.

I. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations and refinish entire unit or provide new units.

J. Install concealed gaskets, flashings, joint fillers and insulation as louver installation progresses where required to make louver joints weather-tight. Comply with Section 07 90 00 – Joint Protection for sealants applied during installation of louver.

K. Protect louvers and vents from damage of any kind during construction period including use of temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at time of Substantial Completion.

L. Restore louvers and vents damaged during installation and construction period so that no evidence remains of correction work. If results of restoration are unsuccessful, remove damaged units and replace with new units.

M. Do all cutting and fitting required for the installation in a neat manner.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Upon completion remove any and all protective coatings, and clean off all parts of the work in accordance with Contract Documents.

END OF SECTION

SECTION 09 91 00 – PAINTING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Painting, as specified herein, shall include, but not be limited to, preparation of surfaces, shop painting of items furnished, and field painting of structures, piping, conduit, ducts and equipment, and marking of piping and electrical conduit.

B. Painting shall be provided as shown on the Contract Drawings, specified herein or in the Contract, or as required for a complete installation.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	8
1.10	Warranty	8
PART 2	PRODUCTS	8
2.01	Manufacturers	8
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	13
2.04	Source Quality Control / Shop Tests	13
PART 3	EXECUTION	13
3.01	Examination / Preparation	13
SURFACE PREPARATION GUIDELINES		13
3.02	Application	14
3.03	Field Testing / Quality Control	18
3.04	Startup / Demonstration	18
3.05	Adjusting / Protection / Cleanup	19

D. The following schedule, attached after the End of Section designation, is a part of this Section:

1. Material Paint Schedule

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 05 97 - Identification for Process Equipment.

1.04 REFERENCES

A. SSPC - The Society of Protective Coatings (formerly of Steel Structures Painting Council)

1. SSPC-SP 1 Solvent cleaning
2. SSPC-SP 6 Commercial blast cleaning
3. SSPC-SP 10 Near white cleaning
4. SSPC-SP 2 Hand tool cleaning
5. SSPC-SP 11 Power tool cleaning to bare metal
6. SSPC-SP 15 Commercial grade power tool cleaning
7. SSPC-SP 16 Brush off Blast Cleaning of Non Ferrous Metals

B. ASTM - American Society for Testing Materials

1. ASTM D3359 - Measuring Adhesion by Tape Test
2. ASTM D16 - Terminology Relating to Paint, Varnish, Lacquer, and related Products

C. NSF - National Sanitation Foundation Standards

D. ISO - International Organization for Standardization

1. ISO 14025 – Requirements and Guidelines for Type III Environmental Labels and Declarations.
2. ISO 14044 - Requirements and Guidelines for life cycle assessment (LCA) studies and life cycle inventory (LCI) studies.

E. EPD - Environmental Product Declaration

1. A third-party verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

1.05 DESCRIPTION

A. Safety Requirements

1. All painting materials specified herein, and ingredients of coatings containing substances that are potentially toxic or hazardous shall be shipped with warning labels. These products shall be applied in strict conformance with the safety requirements of the following:

a. Manufacturer

b. National Paint and Coatings Association (NPCA)

c. Society of the Plastics Industry (SPI)

d. Manufacturing Chemist Association (MCA)

e. Society of Protective Coatings (SSPC)

f. United States Government Occupational Safety and Health Administration (OSHA)

g. Health and Safety Requirements of the State of New York (PESH-Public Employees Safety and Health)

h. Health and Safety Requirements of the City of New York (COSH-Citywide Office of Safety and Health)

B. Environmental Requirements

1. Weather:

a. Air and surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.

b. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.

c. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

d. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog or mist.

e. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

2. Ventilation

a. Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D102.

3. Dust and Contaminants:

a. Schedule coating Work to avoid excessive dust and airborne contaminants.

4. Protect Work areas from excessive dust and airborne contaminants during coating application and curing.

1.06 QUALITY ASSURANCE

A. Paint Quality Assurance Records

1. The following information shall be recorded for every paint project and submitted to the Project-Manager:

a. Date

b. Shift

c. Part Temperature

d. Dew Point

e. Paint Batch Number/s

f. Mixing Time for Each Part and the Combined Parts of a Paint System

g. Pot Life

h. Curing Time of Primer and Finish Layers

i. Paint thickness measurements (DFT)

j. Holiday Test Results and Repair Data

k. Peel Test Results and Repair Data

l. Foreman or Supervisor's Signature

B. Test Surfaces

1. The Contractor shall paint certain areas of concrete and other surfaces, where directed, using approved coatings for use by the Engineer for comparisons with coating systems applied during the progress of the Work.

2. Such coated areas shall not be subsequently painted during the entire period of construction or during the period one-year after the date of Final Acceptance.

3. At or about one year after Final Acceptance, the test surfaces shall be inspected by the City for any deterioration such as cracks, blisters, flakes and excessive chalking.

4. The Contractor shall supply all material and labor and shall perform any remedial Work on all such deteriorated surfaces using the coating system represented by the test surface at no additional cost to the City.

C. Painting Requirements

1. General: The Contract does not specify the surface treatment for every individual part of the Work, however this Contract shall be provided with a complete painting job throughout the Work as specified herein. All items customarily or specified to be shop painted shall be primed and finished in the shop. Field painting will not be allowed unless requested in writing to the Engineer, and written consent is given by the Engineer. In general, only areas that are to be field welded are not to be painted until field erected.

2. Manufacturer's Standard Finished Items: The following items shall be furnished with the manufacturer's standard prime and finish coats applied

in the shop: pumps, motors, gears, gear housings, air compressors, wall fans, temperature control and instrument panels, process air blowers, engines, filters, strainers, air dryers, meters, gas boosters, gas turbines, generators, panelboards, transformers, boilers, condensing units, water chillers, cooling towers, condensers, heat exchangers, humidifiers, air handling units, sound attenuators, air conditioning and dehumidification units, convector cabinets, unit heaters, enclosures for finned tube radiators, cabinet heaters, boilers, wood seats, lockers, metal toilet partitions, metal urinal screens, aluminum fascia, motor control centers, aluminum light standards, and hoisting equipment. Steel reinforcing bars for concrete shall be coated in accordance with the Contract. When powder coatings are required by the Contract, the powder coatings shall be in accordance with the requirements of the manufacturer of the item.

3. Painted Items: The following items shall be painted as specified herein: steel water storage tank, structural steel and wrought metals, composite metal floor deck, pipelines, hangers and supports, sluice gates, pumps and pumps parts, valves, valve and sluice gate operators and stands, guard housings, air filter equipment, effluent strainers, heat exchangers, air receivers, tanks, air silencing equipment, storage tanks, gas domes, sediment tanks, steel stair framing, steel lintels, hollow metal doors and frames, gypsum wallboard, interior concrete block, interior concrete walls, columns, beams and ceilings, covering over insulation on piping, electrical conduit systems, small piping and copper tubing, ducts, covering over ducts, and PVC piping, valves and fittings.

4. Unpainted Items: The following items shall not be painted, unless otherwise specified: registers, grilles, dampers and linkage, fire sprinklers, name and identification plates and tags, floor gratings, brass pipe and fittings, brass valves, stainless steel, wood, stop log panels, spray-on fireproofing steel to receive spray-on fireproofing, surfaces to receive field welding, and faying surfaces of high strength bolted connections.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval by the Engineer. Submittals shall include, but not be limited to:

1. Catalog cuts and reference materials.

2. Color Chart: The Contractor shall submit the manufacturer's standard color chart for color selection for painting of items other than process piping, valves, pipe line equipment, pump casings, blowers and other mechanical equipment and their drive units, all of which shall be in conformance with the "BACKGROUND COLOR" of the General Color Code specified in Section 40 05 97 – Identification for Process Equipment.

3. Paint Samples:

a. Two one-quart samples of each required kind of paint material, or the ingredients thereof which are to be mixed on the job.

b. Samples shall be labeled and shall include the certificate of the manufacturer stating the actual percentages by weight and volume of all ingredients entering into the mixture.

c. Upon request, further samples shall be provided as the Work progresses.

d. Painting materials shall not be applied without written approval of samples by the Engineer.

4. Painted Surface Samples:

a. Upon request, duplicate samples of the results obtained by painting and finishing various materials on the Work shall be submitted. Such samples, and the approved paint applied thereto, shall be applied in strict conformance with these Sections.

b. Finished areas shall be considered adequate for the purpose of determining the quality of the Work. All painting work shall be performed in a quality equal to the approved samples.

c. Where equipment is customarily shipped with a standard finish, samples of the proposed color and finish shall be submitted for approval prior to shipping.

5. Certification:

a. Affidavits from the manufacturer certifying that materials furnished conform to the requirements specified.

b. And that paint products have been checked for compatibility.

6. Immersion Certification:

a. Affidavits from the manufacturer certifying that coatings in immersion service contain no water soluble solvents or corrosion inhibitive (active) pigments with slight water solubility.

7. List of Paints:

a. A list of paint products with mil thickness and solids by volume, including all paint applied in the shop and in the field. The list shall be in accordance with the requirements of this Section and the recommendations of the paint manufacturer.

8. Applicator’s Quality Assurance:

a. Submit list of a minimum of 5 completed projects of similar size and complexity to this work. Include for each project:

1) Project name and location

2) Name of owner

3) Name of contractor

4) Name of engineer

5) Name of coating manufacturer

6) Approximate area of coatings applied

7) Date of completion

9. Warranty:

a. Submit manufacturer's standard warranty.

10. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declarations (EPDs) conforming to ISO 14025 and ISO 14044.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General: All products and materials shall be delivered, stored, and handled as specified in Contract Documents and as follows:

B. Delivery and Storage: All paint materials delivered and stored at the site shall be from the approved manufacturer only.

C. Packaging and Labeling: Paints, stains, varnish or ingredients of paints to be used on the job shall be properly prepared, packed, and labeled. All materials shall be delivered to the Site in original, unbroken containers bearing the manufacturer's printed labels, which shall specify the following:

1. Project and Contract No.

2. Name of manufacturer

3. Address of manufacturer

4. Generic name of paint or ingredients

5. Brand and trademark

6. Schedule letter as listed herein

7. Percent solids by volume

8. Net quantity

9. Date of manufacturer

10. Date packed

D. Storage: Painting materials shall be stored at the Site in manner and place which shall be in accordance with applicable codes and regulations, and in accordance with manufacturer's instructions. The storage space shall be kept clean at all times. Every precaution shall be exercised to eliminate fire hazards.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Standards of Quality: Proprietary protective coatings included herein by brand name or trademark are given solely as standards of quality and for bidding purposes and do not preclude the use of an approved equivalent.

B. Latest Products: Unless specified otherwise, the proprietary protective coatings of the manufacturer's latest products in regular production on the date of receipt of order shall be provided.

C. Equivalents: Equivalent products shall be of a standard, regularly produced product of a manufacturer. Equivalent products shall be submitted on their applicable published printed literature that states the generic type, instructions for use, solids by volume, application rates, and chemical components of vehicles and solids. Equivalent products shall be accompanied by a list of projects where each of the coatings has been used on new construction and has rendered satisfactory service for at least three years. Should the manufacturer's literature of the product being offered call for higher film thickness, the greater film thickness shall be applied, and the submitted schedule shall so state.

D. Paints shall be as manufactured by the following manufacturers:

1. Tnemec Company, Inc., Kansas City, MO.
2. Sherwin Williams, Cleveland, OH.
3. International Paint, Houston, TX.
4. Carboline Company, St. Louis, MO.
5. PPG Amercoat, Little Rock, AR.
6. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Compatible shop and field coats shall be provided.
2. All coats of paint for any particular surface shall be from the same manufacturer.

3. Paint shall be of approved color as selected from the manufacturer's standard range of colors.

4. The Contractor shall submit proposed modifications to the specified painting systems for the Engineer's approval prior to use.

5. Paints containing lead or manganese driers shall not be submitted.

B. Classification of Paints: Alphabetical designations have been used in the following list to classify/group acceptable paints by the type and quality of materials desired. Equivalent material from the manufacturers named above or from other approved manufacturers may be used in any of these paint groups in accordance with the procedures for substitution. Refer to the "Material Painting Schedule", attached after the "End of Section" designation, for applicability of these paint groups.

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
A	**Tnemec:** Series V69 Hi-Build Epoxoline II	69	3.0-5.0
	Carboline: Carboguard 60/61 or Carboguard 635 or Carboguard 890 Series	72 65 75	4.0-8.0 4.0-6.0 4.0-8.0
	Sherwin Williams: Macropoxy 240	72	2.0-4.0
	International Paint: Integrated 345 or Devran 224V	70/77	3.0-4.0 (typically 4.0-6.0)
	PPG: Amerlock 2/400	85	4.0-8.0
B	**Tnemec:** Series V140-44 BR Pota-Pox Plus	69	4.0-6.0
	Carboline: Sanitile 120	38	1.0-2.0
	Sherwin Williams: Dura-Plate 235 (Waste Water)	68	3.0-5.0
	International Paint: Interseal 670 HS or Bar Rust 233HS	82/80	3.0-6.0 (typically 4.0-8.0)
	PPG: Amerlock 2/400	85	4.0-8.0
C	**Tnemec:** Series 1095 Endura-Shield	68	2.0-3.0
	Carboline: Carbothane 134 Series or Carbothane 134WB	70 50	2.0-3.0 2.0-3.0
	Sherwin Williams: Hi Solids Polyurethane 250 or Sherloxane 800	63 90	3.0-5.0 4.0-6.0
	International Paint: Interthane 990V or Devthane 379	71/63	2.0-3.0
	PPG: Pithane Ultra	70	2.0-3.0
D	**Tnemec:** Series V69 Hi-Build Epoxoline II	69	3.0-5.0
	Carboline: Carboguard 61 or Carboguard 691 or Carboguard 635 Series	72 80 65	4.0-8.0 4.0-20.0 4.0-8.0
	Sherwin Williams: Macropoxy 646	72	4.0-6.0
	International Paint: Interseal 670HS or Bar Rust 233H/236	82	3.0-6.0
	PPG: Amerlock 2/400	85	4.0-8.0
E	**Tnemec:** Series 90-97 Tnemec-Zinc	63	2.5-3.5

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
	Carboline: Carbozinc 859 Series or Carboguard 890 Series or Carboguard 60/61	66 75 72	3.0-10.0 4.0-10.0 4.0-10.0
	Sherwin Williams: Corothane I Galvapac	67	2.5-3.5
	International Paint: Interzinc 52	59	3.0-5.0 (typically 2.0-3.0)
	PPG: Amercoat 68HS	70	2.5-5.0
F	**Tnemec:** Series 54 Envirofill Masonry Filler	68	As Required
	Carboline: Sanitile 100 Block Filler or Carbocrylic 3350	54	As Required
	Sherwin Williams: Heavy Duty Block Filler (dry) Kem Cati –Coat Epoxy Filler/ Sealer	50 72	8-10 10-20
	International Paint: Devran 224 or Intercrete 4820	77/NA	As Required
	PPG: Perma-Crete 4-100XI	55	8.0-11.0
G	**Tnemec:** Series 151 Elasto-Grip	17	1.0-1.5
	Carboline: Galoseal WB	31	0.5-1.0
	Sherwin Williams: Pro-Mar 200 Zero VOC / Primer	26	1.0-2.0
	International Paint: Intercryl 520	44	1.0-2.0 (typically 2.0-3.0)
	PPG: Seal Grip 17-921XI	28	1.6
H	**Tnemec:** Series 1026	43	2.0-3.0
	Carboline: Sanitile 155	38	2.0-3.0
	Sherwin Williams: Pro-Mar 200 Zero VOC Series Eg-Shel (dry wall) or Pro Industrial DTM Acrylic Gloss (pipe insulation)	42 40	1.5-2.0 2-4
	International Paint: Intercryl 530/WB	35	1.5-2.0 (typically 2.0-3.0)
	PPG: Speedhide Interior Latex 4510XI	37	1.5

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
I	**Tnemec:** Series V140-AA83 Pota-Pox Plus	82	4.0-6.0
	Carboline: Carboguard 691/ Phenoline Tank Shield	80-100	4.0-20.0
	Sherwin Williams: Macropoxy 646 PW	72	4.0-6.0 (2-4 as concrete primer)
	International Paint: Interseal 670HS or Bar Rust 233H	82/80	4.0-6.0 (typically 4.0-8.0)
	PPG: Amerlock 2	85	4.0-8.0
J	**Tnemec:** Series 141 or Series 435	82 100	1.0-3.0 20-30
	Carboline: Carbozinc 621 / Plastite 4503 / Carboguard 691	80-100	4.0-10.0
	Sherwin Williams: Duraplate 235	68	3.0-5.0
	PPG: Amerlock 2	85	4.0-8.0
K	**Tnemec:** Series 141 or Series 435	82 100	1.0-3.0 20-30
	Carboline: Reactamine 760 Series Plasite 4550S	100 100	20.0-100.0 20.0-60.0
	Sherwin Williams: PolyCote 115 or Duraplate 6000	100 100	25.0-100.0/ 40.0-125.0
	International Paint: Enviroline 222	100	20.0-100.0 (typically 70.0-80.0)
	PPG: Amerthane 490	100	20.0-100.0
L	**Tnemec:** Series 141	82	6.0-14.0
	Carboline: Reactamine 28 or Carboguard 1340 WB	100 55	1.0-2.0 1.5-2.0
	International Paint: Interzone 954	85	14.0-18.0 (typically 18.0-20.0)
	PPG: Amerlock 2	85	4.0-8.0
M	**Tnemec:** Series 431 Perma- Shield PL	100	30.0-40.0
	Carboline: Reactamine ET	100	30.0-40.0
	Sherwin Williams: Duraplate UHS or Duraplate 6000	100 100	30.0-40.0 40-60
	PPG: Novaguard 890	100	25.0-30.0

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
N	**Tnemec:** Series FC22 or 22 Epoxoline	100	20.0-30.0
	Carboline: Phenoline Tank Shield / Polyclad 777 Series	100	20.0-30.0
	Sherwin Williams: Sher Plate PW or Duraplate UHS	100 100	25.0-35.0 25-35
	International Paint: Interline 975P	100	30.0-40.0 (up to 50.0 mils max)
	PPG: Novaguard 810 ER	100	20.0-40.0

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Surface Preparation: Prior to painting, Surface preparation prior to painting shall be in accordance with the following guidelines and as recommended by the painting material manufacturer.

SURFACE PREPARATION GUIDELINES	
Class of Work	Preparation of Surface Prior to Painting
Structural Steel and Steel Encased in Concrete, Masonry or Fireproofing	All visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 33 percent of each square inch of surface area in accordance with Society of Protective Coatings (SSPC-SP6).

SURFACE PREPARATION GUIDELINES	
Class of Work	Preparation of Surface Prior to Painting
Steel (other than structural, encased or galvanized) and Steel Submerged Under Water	All visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 5 percent of each square inch of surface area in accordance with Society of Protective Coatings (SSPC-SP10).
Galvanized Steel and Other Metals	All welds, beads, blisters or protuberances, other than identification markings shall be smooth, and other imperfections shall be removed. All nonferrous metals and galvanized steel, whether shop primed or field primed, shall be solvent cleaned in accordance with Society of Protective Coatings (SSPC-SP1).
Canvas Pipe Covering	All adhering debris shall be removed and indentations or other unsightly spots shall be smoothed out to give a uniform, even surface. Surfaces shall be brushed clean.
Gypsum Wallboard and Plastered Surfaces	Gypsum wallboard shall be prepared as recommended by the wallboard manufacturer. Plaster surfaces shall be dry. Scratches, cracks, holes and other defects shall be filled flush with adjoining surfaces by approved methods, sandpapered smooth, and brushed clean.
Concrete and Masonry Surfaces	Concrete and masonry shall be dried for a minimum of 28 days and then the dry concrete and masonry shall be brushed and washed to remove all loose dirt, dust, free lime and other deleterious substances by approved methods. Protruding fins and other adhering matter shall be removed or ground until a smooth, even finish is obtained. Concrete surfaces to be painted shall be acid etched or otherwise roughened as recommended by the manufacturer of the coating to be applied, to produce a slightly granular surface required for adherence of coating to the concrete, unless otherwise indicated.
PVC	All adhering debris shall be removed and surface shall be roughened using suitable sandpaper. Surfaces shall be dry and free from dirt, oil, grease etc.

3.02 APPLICATION

A. General: All painting and coatings shall be applied in accordance with the manufacturer's recommendations and approved submittals. A representative of the paint manufacturer shall inspect the surfaces to be painted and shall advise on the proper application. The paint manufacturer representative shall periodically be consulted regarding ambient temperature and humidity conditions.

B. Shop Painting: The following items shall be provided with shop coats of primer and finish coats as herein specified before exposure to the weather:

1. Metals:

a. Structural steel

Note: Consider using hot dip galvanizing at crevices or hard to reach places on structural steel.

b. Miscellaneous steel and wrought iron

c. Ornamental wrought and light iron

d. Iron castings

2. Machinery and Equipment:

a. Mechanical and electrical equipment

3. Pipe:

a. All piping except galvanized iron, stainless steel, aluminum, copper, brass and bronze piping.

C. Field Painting: All painting at the site of the project is hereby designated as field painting for those items that cannot be shop painted or are touched up due to minor damage to the painted surface.

1. Repair and Repainting: Field coatings shall not be applied until all marred surfaces have been repaired or repainted. Shop coated surfaces shall be thoroughly cleaned and retouched prior to the application of successive paint coats in the field.

2. Unpainted Materials: Do not paint or finish copper, bronze, chromium plate, nickel, stainless steel, aluminum (except ducts and conduit adjacent to finish painted surfaces), monel metal, lead, lead coated copper and brass, except as otherwise indicated.

3. Items to Receive Coating: All ferrous metals and insulated surfaces shall be provided with a protective coating. Interior surfaces, exposed masonry walls and concrete walls, floors and ceilings shall be provided with protective coatings as specified.

4. Surface Condition: Only surfaces that are dry and free from dust, grease or other undesirable or interfering substances shall receive coatings. Coatings shall be as specified in the “Material Painting Schedule” , attached after the “End of Section” designation.

5. Application: Finish coats shall be applied after all adjacent work has been completed. Successive coats shall have different shades or tints of color wherever possible. Colors shall be as selected and approved by the Engineer. Prime and successive finish coats shall be cleaned, sand papered, or otherwise treated before the next coat is applied, in accordance with the recommendations of the coating manufacturer, and as approved

by the Engineer. All coats shall be inspected and approved by the Engineer, before application of any succeeding coats. All coats shall be applied to the dry film thickness (DFT) specified. Coatings shall be applied by skilled personnel under adequate illumination. All painted surfaces shall be left in a clean, orderly and acceptable condition.

6. Surface and Atmospheric Conditions: Paints shall not be applied when the surface temperature is less than 40 degrees F, when the relative humidity exceeds 85 percent, or when the surface to be painted is wet or damp, unless more stringent requirements are called for by the paint manufacturer.

D. Field Painting Operations: Surfaces to be given protective coating shall be thoroughly cleaned. Scratches and abrasions on equipment which has been shop coated shall be refinished and all surfaces to be field painted shall be approved by the Engineer before proceeding with painting. Painting shall be performed in a continuous and orderly operation to facilitate adequate inspection, however material subject to weathering or corrosion shall be given prime coats as quickly as practicable.

1. Method of Application: All paint material shall be applied by brush or roller. Spray painting will be permitted only with the specific approval of the Engineer. Surfaces which are so close together as to prevent the insertion of a standard size roller or brush shall be painted thoroughly with the prescribed number of coats by using special narrow rollers or brushes.

2. Adjacent Areas: Areas under and adjacent to painted surfaces shall be fully protected at all times. Dripped or spattered paint shall be promptly removed and any adjacent surfaces that have been damaged or discolored by overspray shall be repaired, refinished, and repainted.

3. Tinting: Successive coats of paint shall be tinted to make the various coats easily distinguishable. Undercoats of paint shall be tinted to the approximate shade of the final coat of paint. Final coats of paint shall not be applied until all other work has been completed, the dirt and rubbish removed and the surfaces suitably prepared. Paint to be applied shall be at room temperature.

4. Conditions for Application: Each coat of paint shall be given sufficient time to cure per the manufacturer's recommendation before application of the succeeding coat. Each succeeding coat shall be applied within the recoat time specified by the manufacturer; otherwise the painted surface shall be prepared per the manufacturer's recommendation before it is recoated. Exterior painting will not be allowed in dust laden air, during damp or threatening weather, or on moist or wet surfaces, or when the surface temperature is below 40 degrees F on a falling thermometer or under 50 degrees for catalyzed epoxy material; it will not be allowed in extreme heat or when metal is hot enough to cause the paint to blister and produce a porous film. Do not apply interior painting until the building is

thoroughly dry. If the temperature in the interior of the building, in the opinion of the Engineer, is too low painting will be stopped until the building is heated. Proper ventilation and sufficient heat shall be maintained to permit the paint to dry. The building shall be maintained to be free from dust.

5. Remedial Work: Any paint found defective shall be removed. Touch-up and remedial painting shall be provided as directed and as required until completion and acceptance of final work. If damage to the painted surface is excessive, as determined by the Engineer, that item shall be rejected and shipped back, at Contractor's expense, to be properly recoated before it can be accepted.

6. Application: Each coat of paint shall be applied as a continuous film of uniform thickness, free of pinholes and blemishes, to the maximum extent practicable. Any thin spots or areas missed in the application shall be repainted and permitted to dry before the next coat is applied. An approved low voltage wet sponge "holiday" detector shall be used as directed by the Engineer. All paint shall be carefully applied to a smooth even coating without runs or sagging. Enamels shall be brushed with a smooth even flow. Each coat of paint shall be dry, not only on the surface, but throughout the thickness of the paint film, before the next coat is applied. Finished surfaces shall be uniform in gloss, finish, and color, and free from flash spots and brush marks. In all cases, the resultant paint film produced shall be satisfactory in all respects to the Engineer.

7. Thinning: If the paint material must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material (i.e., one gallon of paint as originally furnished must not cover a greater surface area when sprayed than when applied unthinned by brush). Where thinning is necessary, only the products of the manufacturer furnishing the paint shall be used for the particular purpose, and thinning shall be done with the manufacturer’s knowledge, in accordance with his printed instructions.

8. Thickness and Adhesion Testing: Dry film thickness of each coat shall be as specified herein. Dry film thickness will be checked by the Engineer or a representative with a magnetic gauge for ferrous metal in accordance with SSPC 2 or Tooke gauge destructive test for concrete. Film thickness of shop coats or other previously applied coating shall be checked by the Engineer or a representative and recorded before painting in order to determine thickness of field coats. Dry film thicknesses for concrete surfaces shall be determined by measuring with a wet-film gauge and by material consumption. Paint adhesion shall be tested by the peel method in accordance with ASTM D 3359.

9. Inaccessible Items: Exposed members which will be inaccessible after erection shall be painted and cleaned prior to erection.

10. Coverage: All surfaces to be painted shall be completely covered. When color on undercoats shows through the final coat of paint, surfaces shall be covered by additional coats until paint is of uniform color and appearance and coverage is complete.

11. Safe Atmosphere: The Contractor shall provide sufficient temporary ventilation during painting operations in enclosed areas to remove moisture and solvents, and to keep the atmosphere safe from harmful or dangerous fumes and dust levels for personnel.

E. Workmanship: Only skilled painters shall perform the work and specialists shall be employed where required. Finished surface shall not show brush marks or other irregularities. Top and bottom edges of doors shall be painted as required for the adjacent surfaces. Undercoats on hollow metal shall be thoroughly and uniformly sanded with No. 00 sandpaper, or equal abrasive, to remove all surface defects and provide a smooth, even surface.

F. Mixing: All paints and coatings shall be mixed in accordance with the manufacturer's instructions on the printed label. The Contractor shall provide galvanized iron pans of sufficient size to contain all mixing pails and mix all paints and ingredients therein.

G. Rates of Application: Paints shall be applied so as to give coverage per gallon not greater than that recommended by the manufacturer. Quantities of paint used for successive coats on the various parts of the work shall be recorded in a manner satisfactory to the Engineer.

H. Touch-Up of Shop-Primed and Finished Items: Touch-up of any and all damaged portions and imperfections in shop-primed and finished items shall be accomplished using the same paint as used for the shop prime and finish. Surface shall be prepared prior to touch-up by wire brushing and sanding to remove rust, scale and loose paint.

I. Aluminum and Incompatible Surfaces: Where aluminum surfaces come in contact with incompatible metals, lime, mortar, concrete or other masonry materials, one field coat of Group A paint as specified under Article 2.03 "Classification of Paints" in this Section shall be applied to the incompatible surfaces.

J. Concealed Surfaces: All wall surfaces which will be concealed by equipment shall be painted before equipment installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. The Contractor shall touch up and restore any finish damaged. Paint or other finishes spilled, splashed or splattered shall be removed from all surfaces using care so as not to mar any surface or item being cleaned.

1. The Contractor shall rectify any failures or breakdowns, loosening of the paint or coatings within a year after acceptance of work, regardless of the paint systems used. This will require removal of the entire coating where failure occurs and repainting with the coating system previously specified. Patching will not be allowed.

END OF SECTION

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N) Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Steel and Iron - Structural and Miscellaneous Uses:																				
Interior (Indoors) shop primed, field finished	B or E or I	A	A or D	A	A	B or I	A	D	A	B	B or I	A	D	A	B	--	A	D	A	B
Exterior (Outdoors) shop primed, field finished	B or I	A	A or D	A or B or E	A	C	A	D	A or B	B	--	A	D	A	B	--	C	C	C	C
Submerged, Buried or Continuously Wet Exposed to sewage, shop primed, field finished	B or I	A	A	B	B	J or K or L or M	A	B or J	B	B	--	D	B or J	D	B	--	D	B or J	D	--
Steel and Iron - Industrial Equipment (Exposed to wastewater):																				
Submerged, Buried or **continuously wet in wastewater**, completely shop coated inside and out, includes OEM factory finished items such as gates, valves, etc.	J or K or L or M	A Or K*	A or M*	D or K or L	A	J or K or L or M	A	B or J	D	B	--	A	B or J	D	B	--	--	B or J	D	B

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N) Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Above grade, indoors, **exposed to waste water**, completely shop coated inside and out, includes OEM factory finished, items such as gates, valves etc.	J or K or L or M	A or N*	A or M*	D or K or L	A	J or K or L or M	A	B or J	A or D	B	--	A	B or J	A or D	B	--	--	B or J	A or D	--
Above grade, outdoors, **exposed to waste water**, completely shop coated inside and out, includes OEM factory finished, items such as gates, valves etc.	J or L or M	A or N*	A or M*	D or E or K or L	A	J or L or M	A	B or L	A or D	B	--	A or C	B or J	A or D	B	--	--	C	A or D	--
Inside of item immersed in sewage	J or K or L or M	A or N*	A or M*	D or K or L	B	J or K or L or M	A	B or J	D	B	--	A	B or J	D	B	--	--	B or J	D	B
Ductile Iron or Steel Process Piping, submerged, Buried or constantly wet, **exposed to sewage**, H2S exposures, OEM factory finished.	M*	A or K*	A Or M*	D or K	M	--	A	B	D or K	--	--	A	B or J	D or K	--	--	--	B or J	D or K	--
Steel and Iron - Industrial Equipment (Exposed to Potable water):																				

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** **Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Shop primed, field finished	B or I	A or J	E or I	B or I	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	B or I	--
Exposed to Potable water (NSF) completely shop coated, inside and out, OEM factory finished items such as Gates, Valves etc.	B or I	A or J	E or I	B or I or N	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	--	--
Equipment above grade, indoors, **exposed to Potable water** (NSF), completely shop coated inside and out, OEM factory finished items such as Gates, Valves etc.	B or I	A or J	E or I	B or I or N	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	--	--
Equipment above grade, outdoors, **exposed to Potable water** (NSF), completely shop coated inside and out, OEM factory finished items such as Gates, Valves etc.	N*	A or J	E or I or N*	B or I or N	N*	--	D	I	B or I	--	--	D	I	B or I	--	--	--	--	--	--
Ductile Iron or steel process piping **exposed to Potable Water** (shop finished) alternate	N*	A or L or N*	E or I or N*	B or I or N	N*	--	A	I	B or I	--	--	C	I	B or I	--	--	--	--	--	--
MISCELLANEOUS USES:																				
Piping concealed in Masonry	B or I	A	A	A	A	A	A	D	A	B	A	--	D	A	B	--	--	--	--	--

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Piping wrapped in Insulation	A	A	A or D	A or B	A	A	A	D	A or B	B	A	--	D	A or B	B	--	--	--	--	--
Heated Metal (Air Main Piping): Submerged, Buried and Exposed	J or L or M*	D or E or M*	D or M*	D	D	--	E	D	D	D	--	A or D	D	D	--	--	A or D	D	D	--
Concrete Masonry: Interior	F	--	F	--	F	A or D	F	D	F	B	D	A	D	D	B	D	A	D	D	--
Concrete: Interior excluding floors	A	B	--	--	A	A or D	A	D	D	B	D	A	D	D	B	--	--	--	D	--
Concrete: Immersion, Waste Water	A or J or L	J or L	--	--	N	A or J or L	D or I or K*	I	D	N	--	D	B or J or K	D	--	--	--	--	D or K	--
Pipe and Duct Insulation: Exposed	A	--	--	--	A	H	B	H	H	B	H	H	H	H	B	--	--	--	--	--
PVC (Interior)	A	--	--	--	A	A	B	D	A	B	A	A	D	A	--	--	--	--	--	--
PVC (Exterior)	A	--	--	--	A	A	B	D	A	C	A	C	C	A	--	C	--	C	C	--
Gypsum Wallboard and Plaster:	G	B	G	G	G	H	H	H	H	H	H	H	H	H	--	H				--

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** **Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Nonferrous Metal and Galvanized steel: Interior	A	--	--	--	A	A	G	D	A	B	A	A	D	A	--	A	--	D	A	--
Nonferrous Metal and Galvanized Steel: Exterior	A	--	--	--	A	A	G	D	A	C	A	C	C	A	--	C	--	C	C	--
* Requires only one coat.																				

SECTION 10 14 01 – IDENTIFYING DEVICES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Identifying devices as specified herein shall include standing signs, metal letters and numbers signs and appurtenances.

B. Identifying devices shall be provided as specified in the Contract, in accordance with the NYC Fire Code and NYC Building Code, and as required for a complete installation of the equipment or structure.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A.	Section 03 21 00	-	Reinforcing Steel
B.	Section 03 30 00	-	Cast-in-Place Concrete
C.	Section 05 05 23.01	-	Welding
D.	Section 05 05 23.02	-	Miscellaneous Metal Fastening
E.	Section 05 12 00	-	Structural Steel Framing

1.04 REFERENCES

A.	OSHA	-	1910.145 – Specifications for Accident Prevention Signs and Tags
B.	NYCBC	-	New York City Building Code
C.	ANSI/ICC A117.1	-	Accessible and Usable Buildings and Facilities
D.	AWS A5.12	-	Tungsten and Oxide Dispersed Tungsten Electrodes for Arc Welding and Cutting
E.	AWS D1.1	-	Structural Welding Code - Steel

1.05 DESCRIPTION

A. Sustainable Design Requirements

1. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives: Do not use adhesives that contain added urea formaldehyde.
3. Composite Wood and Agrifiber Products: Do not use composite wood and agrifiber products that contain added urea formaldehyde.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Engage a single fabricator, with undivided responsibility for detailing and performance of the signage structure and wall mounted metal lettering.
2. Engage a firm which can show five years previous successful experience in detailing and fabrication of signage paneling, signage structures, and metal lettering, of scope and type similar to the required work.
3. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

B. Installer Qualifications:

1. Engage a single installer skilled, trained and with documented successful experience in the installation of signage structures and wall mounted metal lettering, and with specific skill and successful experience in the erection of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owner, architects or engineers responsible for projects.

b. Approximate contract cost of the ornamental fences and gates.

c. Amount of area installed.

C. Source Quality Control:

1. Obtain all signage structure components and accessories from the same manufacturer.

2. Provide qualified welding processes and welding operators in accordance with AWS D1.1, Section 6 “Qualification”.

3. Provide certification that all welders employed on, or to be employed for, the fabrication of the signage structures and wall mounted metal lettering, have satisfactorily passed AWS qualification tests within the previous twelve months. Contractor shall ensure that all certifications are kept current.

1.07 SUBMITTALS

A. The Contractor shall submit for approval, catalog cuts, shop drawings, and reference materials.

B. Shop Drawings

1. The Contractor shall submit copies of specifications, installation instructions and general recommendations from the identifying device manufacturers, for each type of identifying device product. Manufacturer's data substantiating that the materials comply with the requirements of the Contract Documents shall be included.

2. Drawings showing extent of the Work and all details required for the Work referencing system components provided as samples, and shall include:

a. Complete details for all signs giving sizes and styles of lettering and colors.

b. Complete schedules for all signs, and building name letters giving location, message, letter, size, color, and method of attachment.

c. Details of fabrication and attachment of all items.

d. Complete location plan for all sign types.

C. Samples

1. Submit for approval color and finish samples of each identifying device product, including each accessory and miscellaneous material to be used in the Work.

D. Mockups

1. Mockups of each type of Identifying Device including wall mounded letters, shall be done in shop and await approval before installation.

E. Sustainable Design Submittals

1. Environmental Materials Reporting Form (EMRF) Recycled Content Materials. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

c. The percentage (by weight) of post-consumer and pre-consumer recycled content in the submitted product(s), if applicable.

2. Environmental Materials Reporting Form (EMRF) - Composite Wood Products. Include the following information:

a. Confirmation that composite wood and Agrifiber products contain no added urea formaldehyde.

b. For each laminate adhesive used on site and in the shop, documentation indicating that the adhesive contains no added urea formaldehyde.

3. VOC Reporting Form. Provide the following information:

a. For all adhesives used on site, provide the VOC content in grams/Liter (g/L) less water and other exempt compounds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Materials shall not be delivered to the project site before the time of installation.

2. Materials shall be delivered in sufficient quantities to allow continuity of the Work.

3. All welding and fastening shall be done in shop prior to delivery to the site to minimize installation time.

B. Storage of Materials:

1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.

2. All materials shall be stored in a dry, enclosed area, off the ground and away from all possible contact with water, ice or snow.

3. Damage to materials during storage shall be prevented by minimizing the amount of time they are stored at the site before being incorporated into the Work.

C. Handling of Materials:

1. Materials shall be handled in such a manner to avoid damage or breakage.

2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the site and shall not be incorporated into the Work.

3. Packages or containers shall not be opened until all necessary preparatory Work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for approval by the Engineer.

1. Standard Signs and Handicap Signs: (exterior)

a. Nelson-Harking Industries

b. Or approved equal

2. Metal Letters and Numbers: (exterior)

a. Nelson-Harking Industries

b. American Sign Letters

c. Or approved equal

2.02 MATERIALS / EQUIPMENT

A. General:

1. Accessibility Standard: Comply with applicable provisions in ICC A117.1 for signs.

2. Signs shall be in accordance with the NYC Fire Code, the NYCBC and as directed by the Engineer.

B. Standard Signs and Handicap Signs:

1. All standard signs information shall be as per the Contract Drawings and the In-design File that is to be provided by the Engineer. For signs font, font size, color, logo and graphic refer to the In-Design File.

2. All wayfinding, directional, identifying signage and handicap signs, shall be a standalone structure. No signage shall be secured to the new fence, gates, or other structures.

3. All sign support structures shall be made of White Powder Coated Steel and bolted to concrete footings.

4. All mounting hardware shall be as provided as shown on the Contract Drawings.

5. All signage imagery shall be provided as shown in Attachment 1, and shall be digitally printed on non-directional stainless steel panels.

C. Metal Letters and Numbers (Exterior)

1. All metal letters, numbers, and symbols shall be as per contract drawings and made of:

a. Metal: 316 stainless steel

b. Thickness: 1/2 inch

c. Finish: No. 4 Satin

d. Size: 10 inches and 5 inches - refer to the Contract Drawings

e. Font: Shall be as per the design file that will be provided by the Engineer.

2. All letters shall be manufactured to have Projected Mounting Hardware with ½ inch.

D. Attachments: All attachments and anchors necessary for concealed installments of identifying devices shall be furnished.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Wall Mounted Metal Letters

1. All surfaces shall be cleaned and prepared to receive the metal lettering as per the Contract Documents.

2. All pegs/bolts/nuts/clips, etc., fastening the metal lettering to the wall surface shall be of like materials or separated by neoprene washers.

3. The Contractor shall follow requirements for metal fastening as per Section 05 05 23.02 - Miscellaneous Metal Fastening.

B. Post Mounted Signs

1. All steel posts are to be welded to their baseplates or any other items in shop unless otherwise indicated on the Contract Documents.
2. All welding is to be done in accordance with Section 05 05 23.01 – Welding.
3. All structural steel fabrication shall be done in accordance with Section 05 12 00 -Structural Steel Framing.
4. All concrete and concrete re-enforcement to be used for footings shall be done in accordance with Section 03 21 00 - Reinforcing Steel and Section 03 30 00 - Cast-in-Place Concrete.

C. Welding

1. For all welding in shop or in field the Contractor shall adhere to AWS A5.12, AWS D1.1 and any other applicable reference.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall verify that areas to receive identifying devices are properly prepared and completed.

3.02 INSTALLATION

1. All materials specified herein shall be installed in compliance with the NYCBC, ANSI A117, OSHA regulations, and the approved manufacturer's printed specifications. Mounting devices, bolts, screws, nuts, and the like shall be in accordance with the Contract Drawings, and all related section listed herein.

B. Identifying devices shall be installed where shown on the Contract Drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjustment: System components which are dislodged, damaged, expanded, broken, penetrated or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Specifications and properly protected as specified.

B. Protection: Identifying devices shall be protected from all damage and abuse from all other Contractors and installers involved in the Work until Final Acceptance by the City.

C. Cleaning: Upon completion of the project, all protection devices shall be removed and identifying devices shall be touched up as necessary. All exposed surfaces shall be cleaned using a mild solution of detergent and warm water. All surfaces shall be left in a neat and clean condition.

END OF SECTION

SECTION 10 44 16 – FIRE EXTINGUISHERS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install fire extinguishers, complete and operational, with cabinets and all anchor bolts, fasteners, and accessories.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Installation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

C. Refer to the Contract Drawings for the Fire Extinguisher Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Abbreviations and Acronyms:

1. DC Dry Chemical
2. CO2 Carbon Dioxide

B. Reference Standards:

1. NFPA 10 Portable Fire Extinguishers.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to, the following:

1. Action Submittals:
   a. Shop Drawings:
      1) Complete detail and installation drawings for fire extinguisher s and cabinets.
      2) Wall mount hardware.
2. Information Submittals:
   a. Manufacturer's specification data sheets and verification of UL ratings.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle equipment provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. DC fire extinguishers:

1. Ansul Inc., Marinette, WI.
2. Kidde as manufactured by United Technologies Corp., Mebane, NC.
3. Or approved equal.

B. Cabinets:

1. 'Duo-vertical' panel w/ tempered safety glass style, as manufactured by Potter-Roemer Inc., Union, NJ.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. DC fire extinguishers shall be 10 lb. capacity, cartridge operated, hand portable, with wall mount, tri-class dry chemical type, with Underwriters' Laboratories rating of 4A:60B:C.

B. CO2 fire extinguishers shall be 10 lb. capacity, portable carbon dioxide type with wall mounts, having Underwriters' Laboratories rating of at a minimum 1A:10B:1C.

C. Except where indicated to be mounted within cabinets, provide the manufacturer's standard wall-mounting bracket for each fire extinguisher.

D. Cabinets: Surfaced mounted or recessed cabinets as indicated on the Contract Drawings. All cabinets shall be #4 finish type 304 or 316 stainless steel with tempered safety glass vision panel. Size cabinets for extinguishers.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Install fire extinguishers in complete accordance with the manufacturer's printed instructions and the approved shop drawings.

1. Fire extinguishers shall be installed where shown on the Contract Drawings and as directed by the Engineer.

B. Wall mounts for extinguishers shall be securely mounted to masonry with Type 316 stainless steel lag bolts and shields.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to perform testing, adjusting and balancing of all Heating, Ventilation, and Air Conditioning Systems, as specified and/or required for proper operation.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	iNSTALLATION	9
3.03	Field Testing / Quality Control	9
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 27 00 – Measurement and Payment

B. Section 01 33 00 – Submittal Procedures

C. Section 23 31 14 – Metal Ducts and Accessories.

D. Section 23 34 00 – HVAC Fans.

E. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	AABC	Associated Air Balance Council
2.	NEBB	National Environmental Balancing Bureau
3.	HVAC	Heating, Ventilating, Air Conditioning
4.	TAB	Testing, Adjusting, and Balancing

B. Reference Standards:

1.	ASHRAE	Handbook – Fundamentals.
2.	AABC-MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems (1989).
3.	NEBB-01	Procedural Standards for Testing Adjusting Balancing of Environmental Systems (1991).
4.	AABC 81266	National Standards for Field Measurements, Total System Balance, Air Distribution, Hydronics Systems, Volume One.

C. Definitions: Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes the balance of air distribution, water distribution, the adjustment of total system to provide design quantities, the electrical measurement, and the verification of performance of all equipment and automatic controls.

1. Test: To determine quantitative performance of equipment.
2. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).
3. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
4. Procedure: Standardized approach and execution of sequence of Work operations to yield reproducible results.
5. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
6. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets or supply outlets on air

terminals and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

7. Main: Duct containing the system's major or entire fluid flow.

8. Submain: Duct containing part of the systems' capacity and serving two (2) or more branch mains.

9. Branch Main: Duct serving two or more terminals.

10. Branch: Duct serving a single terminal.

1.05 DESCRIPTION

A. This Section includes requirements for the testing, adjusting, and balancing for HVAC Systems. In addition:

1. HVAC equipment shall be completely installed and in continuous operation as required to accomplish the test, adjust, and balance work specified.

2. Reports shall be certified by the testing engineer that the methods used and the results achieved are as specified.

3. Should corrective measures caused by faulty installation require retesting, adjusting and balancing, such work shall be performed at no additional expense to the DEP.

B. All HVAC systems shall be tested, adjusted, and balanced. They include but are not limited to:

1. Ventilation systems

1.06 QUALITY ASSURANCE

A. Test and Balance Personnel Qualifications: The personnel responsible for testing, adjusting, and balancing the specified systems shall have at least three (3) years' experience in testing and balancing systems similar to this Project and shall be an employee of the installer or an independent testing and balancing agency.

B. Contractor shall provide all necessary instrumentation, tools, ladders, and labor to complete all air balancing, tests, and adjustments.

C. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.

D. All testing, adjusting, and balancing of air systems shall be performed in compliance with the standard procedure manual published by the testing, adjusting, and balancing organization affiliated with NEBB, AABC, or SMACNA Organization. Testing, adjusting, and balancing technician shall hold current certification by one of these organizations. Submit certification to Engineer for approval.

E. Contractor shall be solely responsible for the protection and safeguarding of his Work and shall provide every protection against accidents, injury, and damage to persons and property.

F. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents and Section 01 33 00 – Submittal Procedures. In addition, submittals shall include, but not be limited, to:

1. Action Submittals:

a. Contractor shall submit one (1) copy of the standard procedure manual, published by the TAB organization affiliated with the Contractor, to the Engineer for his records.

b. Prior to testing all systems, the Contractor shall submit a test procedure for each and every system to undergo TAB as part of the Work.

c. Report Forms:

1) Submit specimen copies of report forms for Engineer's approval.

2) Forms shall be 8½-in. × 11-in. paper for loose leaf binding, with blanks for listing of the required test ratings and for certification of report.

3) Reports shall be on the organization’s approved forms imprinted with the company's name.

4) Certified report outlining procedure used to balance the system and the types of measuring devices used.

d. The Contractor shall submit a detailed testing procedure which shall include:

1) Step-by-step instructions as to how the tests will be performed including but not limited to temporary layout modifications, procedures for testing instrument functionality, steps required to prove that the Control Strategy has been properly implemented, and steps required to compensate for ambient air temperature versus normal operating temperature such as thermostat setpoint adjustment. The steps shall indicate all actions to be taken, the expected result of the actions, and what the expected result verifies in regard to proving that the unit operates as designed.

2) A list of any additional or temporary equipment necessary to perform the tests.

3) Provide a checklist of items that will checked during the test as listed in Part 3 - Execution. Each item shall be initialed by the Contractor's Testing and Balancing Technician conducting the test. The Contractor's Testing and Balancing Engineer shall sign and date the bottom of the test sheet verifying all results.

e. The Contractor shall submit an adjusting and balancing procedure which shall include:

1) Procedure the Contractor will use for balancing the systems.

2) Tables specific to the equipment for this Project for recording the required information from Part 3 – Execution.

3) Flow diagrams specific to the systems present on this Project. The flow diagrams shall contain at a minimum:

a) A diagrammatic representation of the system

b) All duct or pipe sizes

c) All inline equipment such as fans, pumps, duct heaters, filters, and strainers

d) All air inlet and outlet grilles and registers

e) All dampers, valves, or flow control equipment

f. A list of the equipment the balancing technician will use to balance the system.

g. Submit completed adjusting and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been adjusted and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. The adjusting and balancing reports shall contain at a minimum:

1) Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the Project identification and a title

descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

a) General Information and Summary

b) Technician Qualifications and Certificates

c) Completed Adjusting and Balancing Report including procedure

d) Temperature Control System Settings

e) Calibration Certificates of all Instruments Used

2) Report Contents: Provide the following minimum information, forms, and data:

a) General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address, telephone number, and signature of the Certified Test and Balance Engineer.

b) Calibration Certificates: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to the date of the start of balancing.

c) Flow Diagrams

d) Balancing Datasheets

e) Balancer Comments: The Balancer shall provide comments, suggestions, and corrective actions to any issues that occur during balancing including excessive noise, excessive vibration, or an inability to meet design conditions.

h. Test results shall be submitted on approved forms in a typed format.

i. Submit certified copies of required test reports to the Engineer for approval.

B. Information Submittals:

1. Data Sheets:

a. Submit samples of data sheets on each item of equipment for approval.

b. Submit data sheets on each item of testing equipment required. Datasheets shall include detailed test procedures indicating all actions and expected outcomes to be done during testing

c. Include name of device, manufacturer's name, model number, latest date of calibration, and correction factors.

2. Balancer's Qualifications:

a. Submit work experience or resume of proposed biographical data on employee who will directly supervise the TAB Work.

b. Licenses held by the balancer.

c. Submit a record of at least five (5) years' experience in the testing and balancing contracting industry, engaged in HVAC work, including but not limited to:

1) Names of projects.

2) Approximate contract cost of the TAB Work.

3) Amount of area that was tested, adjusted, and balanced for each project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Instruments:

1. General:

a. Contractor shall provide all necessary instrumentation, tools, ladders, etc. to complete all air and hydronic balancing tests and adjustments.

b. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.

c. Flow-measuring hoods (manufactured, not fabricated) shall be acceptable for measurement of ceiling diffuser performance only.

d. Contractor shall assume full responsibility for safe keeping of all instrumentation during the course of work.

B. Air balance instruments:

1. Provide all velometers, anemometers, pitot tubes, differential air pressure gages, manometers, hook gages, static pressure probe units, etc. as may be required to perform all air balance tests of HVAC equipment, ducts, registers, grilles, etc.

C. System performance measuring instruments:

1. Provide insertion thermometers, sling psychrometers, tachometers, revolution counters, clamp-on volt-ammeter recorders, and other instruments as required to measure all facets of the complete HVAC system performance.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Implementation

1. All TAB of air and hydronic systems shall be performed in compliance with the standard procedure manual published by the TAB organization affiliated with the Contractor and submitted to the Engineer for approval as specified herein. Contractor shall be solely responsible for the protection and safeguarding of his work and shall provide every protection against accidents, injury, and damage to persons and property.

2. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day.

3. Contractor shall be fully responsible for removal and reinstallation of ceiling system and replacement of any component damaged.

4. Contractor shall install additional access panels at no extra cost to the DEP, as is required to gain access to equipment concealed above ceilings, behind walls, or any other concealed space.

5. Air systems shall be tested, adjusted, and balanced with clean filters.

6. Hydronic systems shall be tested, adjusted, and balanced with clean strainers.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. The Contractor shall conform to the requirements of this Contract Equipment Check:

1. Verify proper overload heater sizes.
2. Verify function of safety and operating controls.
3. Verify proper operation of equipment.
4. Report on inspection, observation and checking procedures.

B. Testing of Piping, Equipment, and Duct:

1. General:

a. The Contractor shall be bound by this Section to test and adjust all systems and accessories covered under this Contract.

b. The Contractor shall also comply with the requirements of testing as outlined in the individual sections.

c. Furthermore, the Contractor shall operate and maintain these systems as per the requirements of the Contract Documents, and shall leave them in good working order.

d. The Contractor shall provide all necessary equipment and labor for this work.

C. Fans:

1. Pre Startup Inspection:

a. Verify proper equipment mounting and setting

b. Verify that control, interlock, and power wiring is complete

c. Verify alignment of motors and drives

d. Verify proper belt tension

e. Verify proper duct connections and accessories

f. Verify that lubrication is completed

g. Verify that equipment is in good condition and free from damage

h. Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed

i. Verify that equipment and associated ducts are free from debris

j. Verify that equipment is installed per the Manufacturer's requirements

2. Equipment Test:

a. Prior to energizing motor, verify and record voltage of power supply

b. Bump motor to verify direction of rotation

c. Run the fan for one (1) hour of continuous trouble-free operation. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of this procedure.

d. Monitor heat build-up in bearings

e. Monitor for any abnormal noises or vibration

f. Check motor loads against nameplate data

g. Record fan sound levels ten (10) feet from the surface of the fan in five (5) minute intervals during one (1)-hour run period. The sound levels shall not be used for any sound rating verification. The sound levels shall be used for information by the DEP to identify areas that will require hearing protection.

3. System Test:

a. Verify the system operates per the respective equipment Section 23 34 00 – HVAC Fans and Section 23 09 00 - Instrumentation and Control for HVAC including all modes of operation, interlocks, alarms, and safeties.

D. All ductwork systems including air outlets shall be tested, adjusted and balanced for within limits of the required airflows as indicated on the Contract Drawings.

3.04 STARTUP / DEMONSTRATION

A. Overall System Test:

1. After all final tests have been performed on all equipment and on all sub-systems installed under this Contract, including the testing of all controls specified in other Sections, and after the results from all such testing have been accepted, the Contractor shall test the overall system by demonstrating its ability to respond properly to normal changes in controlled parameters, as well as to system upsets.

2. To facilitate this, the Contractor shall make available a minimum of two (2) personnel, thoroughly familiar with the systems and equipment installed under this Contract, for a minimum of seven (7) days to test the system by changing controlled parameters and generating system upsets as directed by the Engineer, and demonstrating that the sequential action appropriate to the particular change or upset occurs automatically.

3. Where actual change or upset is not feasible, the Contractor shall simulate the change or the upset.

4. Controlled parameter changes shall include, but not necessarily be limited to, any change in temperature, pressure, flow rate, fluid level, load, etc., which should result in an automatic change in the position of a control valve or control damper, in the output rate of a piece of equipment, in the normal start-up or shutdown of equipment, etc.

5. The change in the state of the controlled device or equipment shall be shown to result in a corrective action on the controlled parameter.

6. Upsets shall include, but not necessarily be limited to, any condition which should cause annunciation of an alarm, safety shutdown of equipment, startup of standby equipment, closing of fusible-link devices, lifting of relief valves, etc.

7. The Contractor shall immediately restore to its original state any safety device, the state of which has been changed by its having been tested.

B. Contractor shall immediately correct any system deficiency that should occur during testing.

C. After the overall system testing has been completed, and after all final adjustments have been made, the Contractor shall operate and maintain all new systems and equipment, site-wide, associated therewith, for a period of thirty consecutive days.

1. During this period, all normal maintenance (filter replacements, strainer cleaning, periodic checks of safety devices, datalogging, etc.) shall be performed by the Contractor.

2. If, during this period, any work beyond routine maintenance of equipment and materials installed under this Contract, should be required to maintain proper operation of the overall system, the elapsed time shall be forfeited, and a new thirty-day period shall commence following the completion of the corrective action.

D. Balancing and Adjusting:

1. In addition to any other reference to balancing and adjusting specified elsewhere in these Section, the Contractor shall be bound by this portion of the Section to balance, adjust and leave in good working order all systems and accessories covered under this Contract.

2. The Contractor shall procure the services of an independent balancing and testing agency which specializes in the balancing and testing of heating, ventilating and air conditioning systems to balance, test and adjust all systems installed under this Section.

3. The Contractor shall advise the Engineer at least two weeks in advance of the date scheduled for balancing to commence; at the Engineer's discretion, the balancing shall be conducted in the Engineer's presence.

4. At least three (3) months prior to the commencement of balancing, the Contractor shall forward a detailed explanation of the balancing procedure to the Engineer for review. In general, the method shall conform to those specified by the AABC or SMACNA.
5. All piping systems shall be balanced under this Section to provide the flows indicated on the Contract Drawings.
6. Air systems shall be balanced before all hydronic and refrigerant systems.
7. Before beginning to balance the air systems the Contractor shall check, in the presence of the Engineer, all filters and coils for cleanliness, dampers (automatic, volume and fire) for correct position, all fans for proper rotation, and temperature controls for minimum completeness to allow for proper balancing.
    a. If any of the above or other conditions are found which would not allow for proper balancing the Contractor shall take the necessary corrective actions, at his own expense, before balancing begins.
8. All heating, ventilating, and air conditioning systems shall be balanced by the Contractor by adjustment of dampers, fan sheaves, apparatus and air outlets to provide the air quantities indicated on the Contract Drawings. If necessary, adjustments of air outlets shall be made to eliminate drafts.
9. Balancing for all air systems shall be accomplished in a manner to first minimize throttling losses, then fan speed shall be adjusted to meet design conditions. All air outlets and fans shall be balanced within 5% of the design capacity.
10. Fan Belt Deflection: No less than ¼-in. or more than a ½-in.
11. After the systems have been balanced, the Contractor shall submit and certify to the City, a list containing the following minimum information for air outlets and equipment:
    a. Room or facility served.
    b. Size, quantity and model of air outlet or equipment.
    c. Type of air outlet or equipment.
    d. Air flow indicated on Contract Drawings.
    e. Air flow measured.
    f. Fan cfm indicated on the Contract Drawings.
    g. Fan cfm measured.
    h. Fan motor running amps.
12. The Contractor shall submit all recorded data to Engineer for review.

13. The Contractor shall adjust any or all equipment which, in the City's opinion, is not set within acceptable limits of ±5%.

E. Automatic Control Systems:

1. In cooperation with the control manufacturer's representative and as per the requirements of Section 40 80 82 - PMCS Startup and Field Testing, set and adjust automatically operated devices to achieve required sequence of operations.

2. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer.

F. Marking Of Setting:

1. Following approval of TAB Verification Report, the setting of all HVAC adjustment devices including valves, and manual dampers shall be permanently marked by the TAB Specialist so that adjustment can be restored if disturbed at any time.

G. Identification Of Test Ports:

1. The TAB Specialist shall permanently and legibly identify the location points of duct test ports. If the ductwork has exterior insulation, the identification shall be made on the exterior side of the insulation. All penetrations through ductwork and ductwork insulation shall be sealed to prevent air leakage or to maintain integrity of vapor barrier.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Perform testing and balancing procedures on each system identified in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings using materials identical to those removed.

D. Seal ducts, test, and repair leaks created during the testing and balancing procedures on the air systems.

E. Seal insulation to re-establish integrity of the vapor barrier at all locations where the vapor barrier was disturbed during the testing and balancing procedures.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

H. Record all data obtained during testing, adjusting, and balancing in accordance with standard practices and the specific requirements identified in this Section.

I. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

J. Identify and list size, type, and manufacturer of all equipment to be balanced, including air terminals and all end user equipment.

K. Test and record motor voltages, running amperes, shaft rpm and power factor including motor nameplate data, and starter heater ratings for each unit listed above.

L. Air Equipment Balancing

1. The Contractor shall start the fan and verify that the fan amperage and speed are within the design requirements. The Contractor shall then proportionally balance the air distribution system using the dampers at the air terminals. When the system is proportionally balanced, the Contractor shall adjust the fan speed to achieve the total design flowrate of the system. Fan speed adjustment shall be accomplished by adjusting variable pitch drives or by replacing the fan sheaves. The Contractor shall then take final readings for the total system flow as well as readings for each air terminal.

2. For all ducted air systems, the Contractor shall measure the flow rate in cfm at each air inlet, at the fan, and at each outlet for each system. The Contractor shall provide this information in the report to demonstrate that the system as installed meets the seal class rating as indicated in Section 23 31 14 - Metal Ducts and Accessories and Section 23 31 17 – Non-Metal Ducts and Accessories.

3. Test and record the following:

   a. Fan system static pressure.

   b. All fan speeds.

   c. Air quantity delivered by each grille and register.

   d. Pressure drop across each piece of inline equipment such as a duct heater or filter bank. Filters shall be new and clean at time of testing and balancing.

   e. Final damper and air extractor positions for all dampers and extractors

4. Distribution:

   a. Adjust volume dampers, control dampers, etc., to provide the proper design CFM in ducts.

5. Air Terminals:

   a. Identify each air terminal as to location and determine required flow reading.

   b. Test and adjust each air terminal to within flow rate tolerance of design requirements as listed below. Under no circumstances shall

the balancing impact the pressurization of spaces that are required to have a specific pressurization:

1) Diffusers and Supply Registers: zero percent to plus ten percent (0% to +10%)

2) Return Registers: zero percent to minus ten percent (0% to -10%)

3) Exhaust Registers: zero percent to minus ten percent (0% to -10%)

6. Verification:

a. At the completion of the balancing Work, the Contractor shall check and record the flow rate and static pressure at all supply, return, and exhaust air points to show final balanced conditions. The Contractor shall provide in the report a table with a summation of readings comparing the required cfm, final cfm, and final static pressure for each supply, return, and exhaust terminal and all final damper positions.

b. Verify design cfm at fans as described above.

c. If the air systems are not properly balanced, the Contractor shall re-balance and recheck all data.

M. The testing and balancing activities described in this Section shall culminate in a report to be provided in quadruplicate (4), individually bound and also provided electronically to the Engineer for approval. Neatly type and arrange data. Include with the data, the dates tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken after all corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation. The intent of the report is to provide a reference of actual operating conditions for the DEP's operations personnel.

N. All measurements and recorded readings (of air, electricity, etc.) that appear in the report must have been made at the Project Site by the permanently employed technicians or engineers of the TAB Firm.

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish, install, and test all metal ductwork, with auxiliary equipment and accessories, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Installation	10
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	13
3.05	Adjusting / Protection / Cleanup	13

C. The following schedule(s), attached after the end of section designation, are a part of this Section:

1. Schedule 23 31 14-1, Schedule of Metal Duct Construction Standards.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 07 92 00 – Joint Sealants.

B. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC.

1.04 REFERENCES

A. ASHRAE Latest Edition.

B. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E437 Standard Specification for Industrial Wire Cloth and Screens (Square Opening Series)

D. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

E. SMACNA HVAC Duct Construction Standards.

F. SMACNA Rectangular Industrial Duct Construction Standards.

G. SMACNA Seismic Restraint Manual - Guidelines for Mechanical Systems.

H. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.

I. UL 181 Standard for Factory-Made Air Ducts and Air Connectors.

J. UL 214 Standard for Tests for Flame-Propagation of Fabrics and Films.

K. UL 555 Standard for Fire Dampers

1.05 DESCRIPTION

A. This Section includes requirements for providing metal ducts and accessories in accordance with applicable standards and regulations. In addition:

1. Metal duct and accessories shall include all painting, coating, lining, gaskets, harnesses, bolts, nuts, and other appurtenances and material required to provide and assemble the lines.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:
    a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.
    b. Perform visual inspection of welding, as per applicable welding code if applicable.
    c. Perform visual and dimensional inspection of completed work.

B. Requirements of Regulatory Agencies and other industry standards: Comply with applicable provisions of agencies below and other associations and authorities having jurisdiction.
1. Underwriters Laboratories, Inc.
2. National Fire Protection Association.
3. National Electrical Code.
4. Local and State Building Codes and Ordinances:
    a. New York State Building Code.
    b. New York State Mechanical Code.
    c. New York State Uniform Fire Prevention and Building Code.

C. Qualifications of Manufacturer:
1. Engage a single firm, with undivided responsibility for performance and other requirements and components of the metallic ductwork.
2. Engage a firm which can show successful experience in the fabrication and erection for metallic ductwork systems of scope and type similar to the required Work.

D. Qualifications of Installer:
1. The Contractor shall have at least five (5) years' experience in the installation of the Work specified herein. The Contractor shall employ only tradespersons with specific skills and experience in this type of Work.
2. The Contractor shall have undivided responsibility as a single firm for performance and other requirements for the installation of the Work specified herein.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:
1. Action Submittals:
    a. The Contractor shall submit the following Shop Drawings and material specifications for the approval of the Engineer:

1) ¼-in. scale duct layouts, complete with.
   a) Dimensions.
   b) Details of construction.
   c) Details of installation, hanger details and spacing.
2) Manufacturer's literature, illustrations, specifications, and Engineering data for the following items, including weights of all component parts:
   a) Registers, grilles, and diffusers.
   b) Fire Dampers (UL Listed), including:
      (1) Closing mechanisms.
      (2) Fusible link operating temperature.
      (3) Installation details.
   c) Access Doors.
   d) Duct Access Doors.
   e) Flexible connections.
   f) Duct sealants.
3) Details of sheet metal safing construction and installation.
4) An air outlet schedule indicating room name and location of each outlet. Cross reference contract designation and manufacturer's model number or name.
5) Details of construction and material to the Engineer for all access doors to ensure the access door material matches the appearance of the finished work.

b. Test Reports: Submit the following test reports for the following:
   1) UL Label, Fire Dampers.
   2) Volume Damper leakage tests from an AMCA-approved testing laboratory.

2. Information Submittals:
   a. Contractor shall submit an affidavit stating that all stainless steel accessories (including, but not limited to: screws, hangers, supports, etc.) for stainless steel ductwork are Type 316 stainless steel.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:
   1. All ductwork shall arrive on site fully fabricated, and not in two halves for field fabrication.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts and special tools necessary to service, disassemble, repair and adjust the materials and products provided under this Section, and as per the requirements of the Contract Documents. In addition, furnish the following spare parts:

1. Twelve (12) spare fusible links.

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair and adjust the products.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ductwork Accessories:

1. Transverse Duct Connections:

a. Ductmate 35® System as manufactured by Duct Mate Industries Inc., Charleroi, PA.

b. Dyn-O-Mate System as manufactured by Duro Dyne Corporation, Bay Shore, NY.

c. Or approved equal.

2. Volume Dampers:

a. Ruskin Co., Grandview, MO.

b. Greenheck Fan Corporation, Schofield, WI.

c. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Metal Ductwork:

1. General:

a. All work shall be constructed and installed properly in accordance with the recommendations given in the latest edition of SMACNA HVAC Duct Construction Standards and SMACNA Rectangular Industrial Duct Construction Standards.

b. All ductwork shall be constructed in accordance with the drawings.

2. Materials:

a. All ductwork shall be constructed of Type 316 stainless steel and all duct accessories (e.g., air outlets, hardware, and fasteners, etc.) shall also be of Type 316 stainless steel, except as follows:

1) Provide galvanized steel (G90, as per ASTM A653 coating) only where explicitly shown on the Contract Drawings. Air devices and ductwork accessories for galvanized ductwork shall be aluminum.

2) Provide aluminum (with 3003 ductwork H-14 alloy and temper) only where explicitly shown on Contract Drawings. Air devices and ductwork accessories for aluminum ductwork shall be aluminum.

3. Stainless Steel Ductwork:

a. Stainless steel duct sheet thicknesses shall be two (2) gauges heavier than the thickness specified for galvanized steel duct in the SMACNA Duct Construction standards.

4. Connections:

a. The transverse duct connections shall be bolted, gasketed connections.

5. Duct Elbows:

a. Duct elbows shall have a minimum centerline radius of 1½ times the width of the duct.

6. Drip Pans:

a. General:

1) Provide drip pans, hangers, and supports for metal ductwork.

2) Drip pan shall be of quantity and size as necessary and required to collect condensate from all metal ductwork and accessories that are part of this Work.

b. Materials and Construction:

1) Drip pans shall be constructed of 16-ga., Type 316 stainless steel.

2) If welding is required to construct the drip pan, Type 316L stainless steel shall be used.

B. Ductwork Accessories:

1. Hangers and Supports:

a. All ductwork shall be securely hung and anchored to the building structure.

1) Unless otherwise explicitly shown on the Contract Drawings, hangers and stiffeners for ducts shall conform to all the recommendations and requirements given in the SMACNA HVAC Duct Construction Standards and the SMACNA Seismic Restraint Manual - Guidelines for Mechanical Systems.

2) Unless otherwise specified herein, hangers and supports shall also conform to all the requirements of Section 40 05 07, Hangers and Supports for Process Piping.

b. Ducts shall be supported on trapeze hangers with angles or rods – the use of strap hangers, sheet metal duct hangers, and/or straps is prohibited.

c. Hanger rod thickness shall be as follows:

1) For all ducts with half-perimeter up to 72-in.: Hanger rods shall be minimum ⅜-in. thick.

d. For all ducts with half perimeter larger than 72 in.: Hanger rods shall be minimum ½-in. thick. A pair of rods shall be provided at each duct support point.

e. Support shall also be furnished at each fitting.

f. The maximum hanger spacing shall be as follows:

1) For ducts with half perimeter up to 72-in.: 8 ft

2) For ducts with half perimeter larger than 72-in.: 6 ft

g. All hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances shall be Type 316 stainless steel, except for use on galvanized steel ductwork, when such may be of galvanized steel construction.

2. Sleeves:

a. Where ductwork passes through masonry walls, partitions, or floors, provide sleeves.

b. Material:

1) For stainless steel and aluminum ductwork: Provide sleeves of minimum 16 gauge, Type 316 stainless steel.

2) For aluminum ductwork: Provide sleeves of aluminum, with rubber, neoprene, or butyl isolation sheet if passing through concrete or masonry.

3) For galvanized ductwork: Provide sleeves of galvanized steel.

3. Volume Dampers:
   a. Volume dampers shall comply with SMACNA Standards.
   b. Materials:
      1) For stainless steel ductwork: Provide manual volume dampers of Type 316 stainless steel construction.
      2) For aluminum and galvanized steel ductwork: Provide manual volume dampers of and aluminum construction.
   c. Blades: Opposed blades, vinyl edge seals.
   d. Provide outside handle, quadrant, and approved position indicator and locking device.
   e. Performance:
      1) Damper Leakage: Not more than 16 cfm/ft^2 at 4-in. W.G.
4. Self-Acting Dampers:
   a. Provide adjustable, counter-balanced type, with fabricated blades set in frame.
   b. Materials:
      1) For stainless steel ductwork: Provide self-acting dampers and frames of Type 316 stainless steel construction.
      2) For aluminum and galvanized steel ductwork: Provide self-acting dampers and frames of aluminum construction.
5. Flexible Connections:
   a. Provide flexible connections in accordance with SMACNA HVAC Duct Construction Standards.
      1) Flexible connections shall be for a pressure classification of 3 in. w.g.
   b. Materials:
      1) For galvanized steel ductwork: Provide 16 ga., 3-in. wide galvanized steel strip flexible connections.
      2) For stainless steel ductwork: Provide Type 316 stainless steel flexible connections.
      3) For aluminum ductwork: Provide 0.080-in. thick, 3-in. wide aluminum strip flexible connections.
6. Vibration Isolation Flexible Connections:
   a. Provide flexible connections for preventing the transmission of vibrations through the ductwork at the locations specified herein.

b. Materials: Vibration isolation flexible connections shall be neoprene-impregnated fabric collars with cemented seams fastened with straps and bolts of the same material as the connecting ductwork.

7. Gravity Backdraft Dampers

a. Provide gravity backdraft dampers located in ductwork:

b. Materials: Provide gravity backdraft dampers of the same material as the ductwork in which they are installed. In addition:

1) Tie Rods: Shall be of aluminum 0.081 ga..

2) Louver Arms: Shall be of aluminum 0.081 ga..

3) Bumpers: Shall be waterproof felt.

4) Bearings: Shall be stainless steel or brass.

c. Construction:

1) Multiple, interlocked blades mounted in frame.

2) Felt gasketed blade edges.

3) Tie rod connecting each blade.

4) Counterweights or adjustable spring attached to tie rods.

5) Metal frame.

8. Bird Screens and Frames:

a. Bird screens shall conform to ASTM E437, Type I, Class 1, 2 by 2 mesh, 0.031-in. diameter stainless steel wire.

b. Materials: Type 316 Stainless Steel.

c. Frames shall be removable type stainless steel construction.

9. Hardware:

a. Materials:

1) All fastening devices used for aluminum and stainless steel ductwork and accessories shall be Type 316 stainless steel.

2) All fastening devices used for galvanized and aluminum ductwork and accessories shall be galvanized.

3) All gasketing material shall be butyl.

10. Brick Vents:

a. Materials:

1) Brick vents used for intake and exhaust openings shall be constructed of 6063-T5 aluminum with 1.5-inch vent

thickness, 1-inch perimeter flange, stainless steel fasteners, and 45-degree blades.

2) Provide with Kynar protective coating, insect screen, and aluminum wall sleeve.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Stainless Steel Ductwork:

1. All stainless steel ductwork shall be shop fabricated in sections with welded flanged ends.

2. No field welding of stainless steel ductwork shall be permitted.

3. Welding equipment and electrodes shall be of a type specifically suited for welding light gauge Type 316 stainless steel to provide consistently good quality welds.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements:

1. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.02 INSTALLATION

A. Metal Ductwork:

1. All ductwork shall conform accurately to the dimensions shown on the Contract Drawings, with the exception that:

a. Ductwork shall be as shown on the Contract Drawings, subject to such modifications as may be necessary to suit field conditions to clear any obstruction or conflicts with other equipment.

2. All ductwork shall be straight and smooth on the inside with neatly finished joints, and shall not be decreased at any point to avoid obstructions.

3. No piping, conduit, or structural work shall be installed in or through any ductwork.

4. All ductwork shall be run as close as possible to structural members, walls, and ceilings.

5. Where existing walls, floors, or roofs must be penetrated, Contractor shall neatly cut the required openings and patch the existing work to provide a neat and finished appearance.

6. Ductwork shall be installed so as to preclude the possibility of vibration under all operating conditions.

7. Install all ductwork and accessories to provide a system free from buckling, warping, breathing, or vibration.

8. Where required, and as shown on the Contract Drawings, the Contractor shall provide blank off baffles to eliminate drafts caused by nearby obstructions.

B. Ductwork Joints:

1. After the installation is completed, the Contractor shall seal all joints.

2. Tape and seal all joints as per SMACNA Duct Construction Standards.

3. Sealants and tape shall have the following ratings:

a. Flame Spread Rating, as per ASTM E84: ≤ 25

b. Smoke Developed Rating: ≤ 50

4. Flanged duct joints shall be 0.25-in Butyl gasketed and bolted together with stainless steel (Type 316) bolts, nuts, washers and lock washers.

5. All metal duct joints shall be airtight with no leakage.

C. Coordinate all air outlets for compatibility with ceiling system.

D. Sleeves:

1. Caulk sleeves airtight with fire resistant sealant between sleeve and ductwork in accordance with Section 07 92 00, Joint Sealants.

E. Volume Dampers:

1. Manual volume dampers larger than 11-in. in any dimension shall be opposed blade type.

2. The damper blades shall be operated by a lockable dial regulator and may be set in any position.

a. The dial regulators shall be marked so that the "open" and "shut" positions are clearly identified.

b. The dial regulators on insulated ductwork shall be mounted on an elevated platform which will finish flush with the surface of the insulation.

3. Manual volume dampers shall be located at accessible points and wherever possible some distance from a duct transition or fitting.

4. Care shall be taken during installation to make certain that sheet metal fasteners do not protrude into the duct and interfere with damper operation.

5. Install volume dampers where indicated on the Contract Drawings and as required to facilitate accurate volume control. Volume dampers specified with air devices shall be installed in addition to those shown on the Contract

Drawings. In addition, dampers shall be installed in all of the following locations:

a. Each branch duct take off, and

b. In both ducts downstream of each trunk duct split.

c. An additional volume damper shall be installed in duct stub to each air outlet for balancing of air volume.

F. Test openings:

1. The test openings shall be sealed by a screw cap and gasket, and shall be installed so that the insulation is not disturbed when the cover is removed.

2. The test openings shall be located as follows in all heating, ventilating, air conditioning systems:

a. In the outside air duct adjacent to the unit.

b. In the exhaust air duct adjacent to the unit.

c. In the main supply duct on each unit.

G. Flexible Connections:

1. All expansion joints in ducts at building expansion joints shall be suitably supported at each end by support guides within 12-in. of joint.

2. All ducts at flexible connections with air handling equipment, and fans shall be supported at free end within 12-in. of flexible connection.

3. Provisions shall be made for supporting all ductwork, dampers, and other ductwork accessories, where necessary.

H. Vibration Isolation Flexible Connections:

1. Install vibration isolation flexible connections between the ductwork and all air moving equipment and at the building joints.

a. Provide flexible connections at both the inlet and discharge of air all handling equipment.

2. Vibration isolation flexible connections shall not be painted or used to correct misalignment.

I. Contractor shall furnish and install sleeves for registers, grilles, and dampers mounted in the masonry, concrete plenums or shafts. Sleeves shall be 16 ga. Type 316 stainless steel.

J. Sheet Metal Safing:

1. Install safing to seal off remaining portions of shafts and louvers which are not covered by the plenums or equipment attached to the shaft or louver.

K. Drip Pans:

1. Route drain pipe of a diameter necessary and required from drip pan to nearest plant drain in accordance with the requirements of Section 40 05 05, Exposed Piping Installation.
2. Drain pipe shall be of copper or brass as per Section 40 05 15, Copper and Brass Process Pipe.
3. Install and restrain drain pipe as per Section 40 05 05, Exposed Piping Installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjustment:
1. Set volume control devices for approximate positions in preparation for final testing and balancing.
2. Start fan system and check for excessive leaks and vibration and correct.

B. Balancing:
1. Systems shall be completely tested, adjusted and balanced by a qualified engineer. A complete balancing procedure shall be submitted for approval. All equipment and connections required to balance the systems shall be provided.
2. All duct systems shall be balanced as specified in Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

C. Cleaning:
1. Remove all loose materials and obstructions from interior of ducts.
2. Remove debris and waste materials resulting from installation.

D. Painting:
1. Surface Preparation and Shop Painting:
a. Clean and prime coat ferrous metal surfaces of equipment in the factory/shop in accordance with the requirements of Section 09 91 00, Painting.
b. Coat polished and non-ferrous metal surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operations.
2. Field Painting:

a. Painting required for exterior surfaces of ductwork and insulation, and finish painting of items only primed at the factory, are specified in Section 09 91 00, Painting.

END OF SECTION

SCHEDULE 23 31 14-1
SCHEDULE OF METAL DUCT CONSTRUCTION STANDARDS (1,2)

Service:	**Pressure Classification: (in. W.G.)**	**Construction Standards:**
All ductwork on fan discharge side	+2	SMACNA HVAC Duct Construction Standards
All ductwork on suction side	-3	
Transfer air duct not connected to fan	±2	

Notes:

1. All accessories (including, but not limited to: turning vanes, air turning devices, manual volume dampers, motor operated control dampers, fire dampers, access doors, supports, angles, clamps, hangers, and hardware) shall be suitable for the pressure classification given above.
2. Ductwork Material Schedule: Refer to the Contract Drawings.

NO TEXT ON THI PAGE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required to furnish, install, and test all HVAC fans, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	8
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	9
3.05	Adjusting / Protection / Cleanup	9

C. All HVAC fans shall be provided in accordance with the schedule shown on the Contract Drawings.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 23 – Metal Fastenings

B. Section 09 91 00 – Painting

C. Section 23 05 93 – Testing, Adjusting and Balancing for HVAC

D. Section 40 05 96 – Vibration Control

E. Section 40 05 97 – Identification for Process Equipment

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	FRP	Fiber Reinforced Plastic

B. Reference Standards:

1.	AISI C1045	Medium Carbon Steel
2.	AMCA 210	Laboratory Methods of Testing Fans for Ratings
3.	AMCA 301	Methods for Calculating Fan Sounds Ratings from Laboratory Test Data.
4.	ANSI S2.19, G6.3	Mechanical Vibration - Balance Quality Requirements Of Rigid Rotors

5. SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems

1.05 DESCRIPTION

A. This Section includes requirements for providing HVAC fans and accessories in accordance with applicable standards and regulations. In addition:

1. HVAC fans shall be furnished complete with all accessories, special tools, spare parts, base attachments, mountings, anchor bolts and other appurtenances as specified and/or required for proper installation.

1.06 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with the applicable provisions of the standards organizations and regulatory agencies, below:

1. Underwriters Laboratories, Inc.
2. National Fire Protection Association.
3. National Electrical Code.
4. Local and State Building Codes and ordinances
    a. New York State Building Code.
    b. New York State Mechanical Code.
    c. New York State Uniform Fire Prevention and Building Code.

B. Qualifications of Manufacturer:

1. All components of the HVAC fans shall be provided by the Contractor through a single HVAC fan vendor.

a. The Contractor (through the HVAC fan vendor) shall have the sole responsibility of matching all components and providing equipment which functions together as a system.

2. The HVAC Fans shall be standard equipment of the manufacturer.

3. The HVAC fans shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

4. All fans shall be selected from performance curves and not from rating tables.

a. Performance data for all fans shall be based on tests conducted in accordance with AMCA 210 and shall be licensed to bear the AMCA certified rating seal for both sound and air performance.

5. Provide units listed by the Underwriters Laboratories, Inc.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

b. Complete assembly, layout, installation, and foundation drawings with clearly marked dimensions.

c. Fan performance curve indicating the operating point.

d. Details of corrosion resistance coating.

e. Weights of assembled units.

f. Motor nameplate data as specified in Section 26 05 91, Low-Voltage Electric Motors.

g. Detailed specifications and data sheets for all accessories such as roof curbs, dampers, damper operators, disconnect switches, vibration isolators, etc.

h. Example equipment nameplate data sheet.

i. Schematic diagrams for electric and control systems showing wiring for individual equipment items and interconnecting wiring diagrams.

j. Shop and field testing procedures.

k. Deviations from the Contract Documents.

l. Wiring diagrams with numbered terminal blocks for all external connections.

m. Description of control system.

n.

o. List of recommended lubricants.

p. Operation and maintenance manuals

q. Fan manufacturer shall provide sound power ratings in the eight octave bands.

1) Sound power levels shall be based on AMCA Standard 301.

2) Sound power ratings shall be in decibels, referenced to 10^{-12} W.

2. Information Submittals:

a. Spare Parts List

b. Special Tools List

c. Reports of Certified Shop Tests

d. AMCA Approval for Fan Ratings

e. List of Lubricants:

1) The manufacturer shall submit a list with a minimum of four (4) manufacturers' standard lubricants which may be used interchangeably for each type of lubricant required.

a) The Contractor shall utilize this list in preparing his comprehensive lubrication survey as described in the Contract Documents.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. The cleaning, preservation, and packing of the HVAC fans for shipment shall be in accordance with the manufacturer's commercial practice.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. The HVAC fans shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed, or otherwise damaged.

2. The HVAC fans shall be protected from corrosion and deterioration and shall be stored in a dry area.

a. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable waterproof covers approved by the Engineer.

3. Interiors shall be kept free from dirt and foreign matter.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the equipment provided under this Section, as per the requirements of the Contract Documents and/or as recommended by the manufacturer. In addition:

1. Provide the following spare parts for up to every four (4) of the same size, model, and type of HVAC fan furnished under this Section:

a. One (1) blower with wheel

b. One (1) set bearing and seal

c. One (1) set sheave

d. One (1) shaft

e. Two (2) sets of belts for each belt driven fan

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In-Line Square Centrifugal Fans:

1. Greenheck, Schofield, WI.

2. Loren Cook, Springfield, MO.

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Fans shall be as shown on the Contract Drawings.

a. The capacity of all HVAC fans shall be as shown on the Contract Drawings.

b. Where shown on the Contract Drawings, explosion proof motors and AMCA Type "A" spark resistant construction HVAC fans shall be provided.

2. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

3. Motors:

   a. Unless otherwise indicated, motors shall be of the totally enclosed premium efficiency fan cooled type.

   b. Motors shall not be selected for operation in the service factor range/zone. The maximum brake horsepower required at any point on the performance curve shall not exceed the rated horsepower of the motor.

4. Electrical Service:

   a. Motors ≤ ⅓ hp : 115V, single phase, 60 Hz.

   b. Motors ≥ ½ hp : 460V, 3-phase, 60 Hz

5. Disconnect Switches: All fans and damper operators shall each be provided with individual externally mounted disconnect switches.

6. Enclosures:

   a. All enclosures shall be NEMA 4X, and of stainless steel construction, unless otherwise shown on the Contract Drawings.

   b.

7. Drive Type:

   a. The fans shall be either direct connected or V-belt drive as indicated on the HVAC Fan Schedule shown on the Contract Drawings.

8. Vibration isolators:

   a. All vibration isolators shall be provided in conformance with the requirements of Section 40 05 96, Vibration Control.

   b. Isolators shall have a minimum efficiency of 90%.

   c. Installation, type, number, and size of vibration isolators shall be in conformance with the manufacturer's recommendations for the frequencies involved.

B. In-Line Square Centrifugal Fans:

1. General:

   a. In-line square fans shall be of centrifugal direct or belt driven in-line type, as indicated on the Contract Drawings.

2. Construction:

   a. Housing:

1) The fan housing shall be of the square design constructed of heavy gauge all aluminum and shall include square duct mounting collars.

b. Wheel:

1) The fan wheel shall be centrifugal backward inclined, constructed of aluminum, and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances.

2) Wheels shall be statically and dynamically balanced.

c. Shaft:

1) Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings.

3. Accessories:

a. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel.

1) The access panels must be of sufficient size to permit easy access to all interior components.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Anchorage Devices:

1. Provide anchorage devices in accordance with Section 05 05 23, Metal Fastenings.

2. Contractor shall furnish anchor bolts and nuts of Type 316 stainless steel, of ample size and strength for the purpose intended, sized by the equipment manufacturer.

3. All hardware for mounting of motor drives and control panels shall be Type 316 stainless steel.

B. Identification:

1. Provide in accordance with Section 40 05 97, Identification for Process Equipment.

2. Each unit of equipment shall be identified with the equipment item numbers shown on the Contract Drawings.

3. A corrosion resistant tag and nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

C. Dampers:

1. All dampers for roof mounted fans shall be mounted in the mounting pedestal with removable access panel for inspection and servicing of damper and operator.
2. Mounting pedestal shall provide solid ventilator support and a weather tight seal.

D. Balancing:

1. All fans shall be statically and dynamically balanced at the speed at which the unit is scheduled to operate. Fans with corrosion resistant coatings shall be balanced after being coated.

E. Coatings:

1. Clean and prime coat ferrous metal surfaces of equipment in the shop in accordance with the requirements of Section 09 91 00, Painting.
2. Coat machined, polished, and non-ferrous metal surfaces and similar un-painted surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operation

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. All HVAC Fans shall be as efficient as those HVAC Fans that have been tested to perform satisfactorily for at least two (2) years.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Inspection:

1. The inspection shall include welding, dimensions, bearings and overall workmanship.
2. The Contractor shall not install damaged items until repairs are made in accordance with manufacturer's written instructions and approval by Engineer.
   a. Only minor repair work will be permitted in the field.
   b. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement.

3.02 INSTALLATION

A. Install HVAC fans in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings. In addition:

1. Units shall be electrically grounded in the field by installing contractor.

3.03 FIELD TESTING / QUALITY CONTROL

A. Furnish the services of a qualified manufacturer's representative to check and approve all installations before operation as well as conduct field testing, in accordance with the requirements of the Contract documents. In addition:

1. The Contractor shall verify that all work furnished and installed conforms to the requirements the Contract Documents.
2. Reports: Submit a report from the manufacturer of each visit to the site. Reports shall provide complete information on time, schedule, tasks performed, persons contacted, problems corrected, test results, training, instruction and all other pertinent information.
3. Perform field tests in accordance with Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3.04 STARTUP / DEMONSTRATION

A. Furnish the service of a qualified manufacturer representative to assist and train the plant operations and maintenance staff in the care, operation, and maintenance of the HVAC fans in accordance with the requirements of the Contract Documents. In addition:

1. The Contractor shall make all adjustments required to place Work in proper operating condition.
2. The Contractor shall include instruction on care and maintenance of the HVAC fans in the training of plant personnel.
3. In the event of trouble with the equipment, the manufacturer's representative shall revisit the site as often as required until all troubles are corrected and the installation is entirely satisfactory.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting:

1. Upon completion of the installation, the Contractor shall adjust all HVAC fans for their intended use.
    a. Assembled fans shall then be dynamically balanced using a vibration analyzer to measure velocity.
    b. The final reading shall not exceed 0.1-in./sec at the fan shaft speed.
    c. The exact level of vibration will be recorded on the fan as proof of the final dynamic balance.

B. Protection:

1. The HVAC fans shall be protected as per the requirements of the Contract Documents. The use of HVAC fans shall not be permitted until permission is given by the Engineer.
    a. When permission is given, the Contractor shall operate each HVAC fan to ensure their performance.

C. Cleaning:

1. In addition to the requirements of the Contract Documents, the Contractor shall thoroughly clean all surfaces of the installed HVAC fans and remove all debris and waste materials resulting from installation.

END OF SECTION

SECTION 26 05 11 – GENERAL ELECTRICAL REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials and equipment required to perform the Work in accordance with the general electrical requirements as specified under this Section and shown on the Contract Drawings.

B. The Work shall also include the following:

1. Inserts and other electrical items which shall be installed embedded in concrete, or built into walls, partitions, ceilings or panels constructed under this Contract.

2. Installation procedures and schedules under other contracts shall be reviewed and coordinated with other contractors regarding the installation of electrical items that must be installed.

3. Keep informed of the construction so the electrical work shall be installed within such time periods as will not delay the work of the other contractors.

4. Notify other contractors in advance of the installation of the work included, so they shall have sufficient time for coordination and installation of interrelated items that are included in their contracts and that must be installed in conjunction with the Work included under this Contract.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5

3.05 Adjusting / Protection / Cleanup.....6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 - Painting

1.04 REFERENCES

A. NEC (NFPA 70) - National Electrical Code

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. All equipment and devices shall be properly connected and interconnected with other equipment and devices so as to render the installations complete for successful operation, regardless of whether all the connections and interconnections are specifically mentioned in the Sections or shown on the Contract Drawings.

B. Similar products shall be by the same manufacturer for uniformity on the Contract.

C. Electrical material and equipment shall be new and shall bear the label of UL, or other nationally recognized, independent testing laboratory, wherever standards have been established and label service regularly applies.

D. Where execution of the Work requires certain systems and equipment to be modified, the Contractor shall perform the work with due regard to maintenance of operations and construction staging in accordance with the specifications.

E. The modification work shall be coordinated in advance with the plant superintendent and existing conditions. Contractor shall field determine and make such investigations as required to determine the functionality of each circuit and identify circuit terminations as required for the modifications intended to ensure the proper interface of all components for a complete functional system.

F. The Contractor shall retain the services of a wiring coordinator, to prepare the point-to-point field wiring diagrams. The wiring coordinator shall have experience in the development of the diagrams of the type specified and shall have served in a similar role on a project of similar size and complexity.

G. Area Classifications

1. Materials and equipment for all indoor areas shall conform to the area classifications shown on the Contract Drawings or stated in the specifications.

2. Materials and equipment for all outdoor areas shall conform to corrosive requirements, unless shown otherwise on the Contract Drawings or stated in the Sections.

3. The locations and requirements shall be in accordance with the following:

   a. Materials, equipment and incidentals installed in corrosive areas shall meet NEC (NFPA 70) and NEMA requirements for corrosive locations. Enclosures installed in corrosive locations shall meet NEMA 4X requirements.

   b. Materials, equipment and incidentals installed in hazardous locations shall meet NEC (NFPA 70) requirements for the Class and Division designated. Enclosures installed in hazardous locations shall be provided with stainless steel hardware and watertight gasketing.

   c. Materials, equipment and incidentals installed in dusty locations shall meet NEC (NFPA 70) and NEMA 12 requirements.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited, to:

1. Point-to-point field wiring diagrams.

2. Qualifications of proposed wiring coordinator who shall prepare the point-to-point field wiring diagrams.

B. Reports

1. Demonstration of equipment report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Point-To-Point Field Wiring Diagrams

1. The Contractor shall provide point-to-point field wiring diagrams for all equipment, including equipment provided by other contractors.
2. The diagrams shall be developed for performance of the work and to document terminations. The diagrams shall be prepared based upon approved shop drawings of related Contracts and inspections as necessary to complete the diagrams. The diagrams shall include:
    a. External wiring for each piece of equipment, panel, instrument and other devices to control stations, lighting panels and motor controllers. The diagrams shall include control, status, signal and power wiring. Power diagrams shall include connections to switchgear, motor control centers, panelboards, panels and field devices.
    b. Numbered terminal block identification for each wire termination.
    c. Identification of the assigned wire numbers and color coding for all interconnections.
    d. Identification of all wiring by the conduit tag in which the wire is installed.
    e. Terminal, junction, and pull boxes through which wiring is routed.
    f. Identification of equipment with functional name and number to which wiring is to be connected.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Shop Finishes

1. Electrical equipment shall be shop painted in accordance with the requirements of Section 09 91 00- Painting.
2. Exposed ferrous metal surfaces except aluminum, bronze, brass and stainless steel components shall be cleaned with a commercial blast and primed with one coat of rust inhibitive primer.
3. Manufactured assemblies such as switchgear, substations, motor control centers, panelboards and motor controllers shall be shop painted in accordance with the requirements of Section 09 91 00 - Painting.
4. Other equipment shall be painted with the manufacturer's best grade finish paint system compatible with the finish coatings specified in Section 09 91 00 - Painting.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Maintenance of Operations

1. Where execution of the work under this Contract requires certain equipment to be taken out of service, the Contractor shall perform the work with due regard to maintenance of operations and construction staging in accordance with the Sections.

2. The Contractor shall schedule the work in advance with the Engineer so as not to affect proper plant operations. When the work is scheduled, the Engineer shall be notified 48 hours prior to proceeding with the work to allow time for the plant superintendent to perform load switching and alternation of equipment.

3. To the maximum extent possible at the end of the workday, all equipment shall be back in place and ready for its normal service use should a plant emergency arise. In addition, should an emergency condition occur during execution of the work, at the request of the plant engineer, the equipment shall be placed back in service immediately and turned over to plant personnel.

4. In the event of accidental shutdown of plant equipment, the Contractor shall notify plant personnel immediately to allow for an orderly restart of affected equipment.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. The Contractor shall demonstrate, in the presence of the Engineer, that all electrical systems and electrically operated equipment operates as specified, designed and as required.

B. The Contractor shall coordinate the demonstration of the electrical systems which are part of other contracts with the other contractors.

C. The demonstration of equipment shall include the following:

1. All power circuits shall be operated to verify proper connection to equipment. Mechanical key-interlocks for circuit breakers shall be operated to verify their proper operation. Power shall be removed and reapplied to automatic transfer switches to verify their operation.

2. Emergency power systems shall be activated to verify their automatic start-up, proper operation while running and proper deenergization and cool down upon availability of normal power.

3. All pushbuttons, indicating lights and similar devices shall be operated to verify proper connection and function. All devices, such as pressure and flow switches and similar devices shall be operated to verify that shut-downs and control sequences operate as required.

4. The Contractor, in coordination with the other contractors, shall operate the systems to verify wiring and adjust the controls, as required, to achieve proper operation. This shall include wiring, timing and switching functions.

D. The Contractor shall provide a demonstration of equipment report. The report shall include complete information on time, schedule, tasks performed, persons contacted, problems corrected, and all other pertinent information.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Restoration

1. The Contractor shall field paint after installation marred or scratched surfaces. All scratches, abrasions and other damage to equipment shall be touch-up painted in accordance with the requirements of Section 09 91 00 - Painting.

END OF SECTION

SECTION 26 05 20 – LOW-VOLTAGE WIRES, CABLES AND ACCESSORIES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing low-voltage electric wires, cables and accessories.

1. Low-voltage electric wires, cables, and accessories shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. Low-voltage electric wires and cables to be provided shall include all accessories.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Installation	12
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 06 11 – Cable and Conduit Schedule

1.04 REFERENCES

A. Definitions

1. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.
2. Low-voltage wires and cables shall mean all insulated electric wires and cables intended for use for power, lighting, control, instrumentation, communication, security and alarm circuits.
3. Low-voltage wires and cable accessories shall mean all devices and items intended to provide mechanical protection, terminate, connect, splice, insulate, tag and manage low-voltage wires and cables.
4. Cable is an assembly of insulated wires combined with fillers and separators in an enclosing jacket of insulating material.
5. All references to the Electric Utility or Utility shall mean Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

Low-voltage wires and cables shall comply with the latest applicable provisions and recommendations of the following:

1. ANSI/ICEA S-95-658/
   NEMA WC70 - Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy
2. ASTM B5 - Standard Specification for High Conductivity Tough-Pitch Copper Refinery Shapes
3. ASTM B8 - Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
4. ASTM D69 - Standard Test Methods for Friction Tape
5. ASTM D2301 - Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
6. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
7. ICEA S-58-679 - Standard for Control, Instrumentation and Thermocouple Extension Conductor Identification

8.	IEEE 1210	-	Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable
9.	NEMA WC 26/ EEMAC 201	-	Binational Wire and Cable Packing Standard
10.	NETA ATS	-	NETA Acceptance Testing Specifications
11.	NEC (NFPA 70)	-	National Electrical Code
12.	ECCCNYS	-	Energy Conservation Construction Code of New York State

13. UL Standard 486A-486B - Wire Connectors

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General:

1. All low-voltage wires, cables and accessories shall be made by an approved manufacturer, and in their construction shall be employed the most improved commercial materials and processes of manufacture.

2. Only low-voltage wires, cables and accessories manufactured under high standards of production and meeting the approval of the Engineer shall be used.

3. Friction tape shall be in accordance with ASTM. D69.

4. All low-voltage wire and cable splicing and terminations shall be done by experienced cable splicers who have worked with similar wire and cable for a period of at least 5 years, using materials and procedures recommended by the wire and cable manufacturer. All splicing and terminations of low-voltage wire and cable shall be in accordance with the instructions of the low-voltage wire and cable manufacturer.

5. The low-voltage wire and cable manufacturer shall use a shop test facility that has recently calibrated testing apparatus and qualified, experienced technicians, for all shop tests. Calibration of testing apparatus shall be within one year.

6. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the U.S. National Institute of Standards and Technology and the NETA acceptance testing specification.

7. The mineral-insulated metal sheath cable installation shall be performed by experienced mineral-insulated metal sheath cable installers who shall have been regularly engaged in the installation of mineral-insulated metal sheath cable for a minimum of the past three years.

8. The Contractor shall retain the services of the mineral-insulated metal sheath cable manufacturer's representative to certify the cable installation is in accordance with the manufacturer's requirements.

9. Field testing of low-voltage wires and cables shall be in accordance with the requirements specified under this Section.

10. The Contractor shall retain the services of an independent testing firm who shall perform acceptance testing on the low-voltage wire and cable installation.

    a. The testing firm shall have experience in the inspection and testing of wires and cables of the type specified and shall be a member company of NETA.

    b. Provide proof of membership or demonstrate that the standards and experience required for membership are possessed, all to the satisfaction of the Engineer.

    c. The testing shall be performed in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers shall be submitted with the products they produce proposed for the contract.

2. Manufacturer's Literature, specifications and engineering data for low-voltage wires, cables and accessories including but not limited to:

    a. Manufacturer and type of wire or cable.

    b. Minimum insulation resistance in megaohms per 1,000 ft. at 20 degrees C.

    c. Material, number and size of strands composing each conductor.

    d. Conductor insulation thickness in inches with material and voltage rating.

    e. Jacket thickness in inches.

    f. Average outside diameter of bare conductor.

    g. Average outside diameter of finished wire or cable and jacket material.

    h. Weight per 1,000 ft. of finished wire or cable.

    i. Minimum bending radius, in inches.

    j. Minimum pulling temperatures at which cable may be pulled without damage.

k. Maximum pulling tensions which may be applied to the cable without damage.

l. Literature identifying the methods and materials which Contractor proposes to use to make splices and terminations. Submittal shall consist of manufacturer's literature evidencing compatibility of the conductor insulation and jacket of the wire or cable with the splicing or terminating materials and methods which Contractor proposes to use.

m. Manufacturer recommended pulling lubricants.

n. Qualifications of splicing and termination personnel.

3. Description of shop and field testing methods, procedures and apparatus with calibration dates shall be submitted. Testing methods and procedures shall be submitted at least 45 days in advance prior to conformation of witness testing dates and actual testing.

4. Qualifications of proposed testing firm to perform acceptance testing shall be submitted. Submit firm experience records at least 45 days in advance to actual testing, five recent references with phone numbers shall be submitted.

5. Qualifications of proposed mineral-insulated metal sheath cable installer shall be submitted. Submit installer experience records with five recent completed installations with names and phone numbers.

6. Certification from the mineral-insulated metal sheath cable manufacturer's representative that the cable installation is in accordance with the manufacturer's requirements.

B. Reports:

1. Shop and field test reports shall be submitted.

2. Acceptance testing report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Low-voltage wires, and cables shall be delivered, stored and handled in accordance with the Specifications and the manufacturer's instructions.

B. Deliver low-voltage cables on factory reels conforming to NEMA WC26. Each end of each length of cable shall be hermetically sealed with the manufacturer’s end caps and securely attached to the reel. Reels with unsealed ends will be rejected.

C. Inspect wire and cable protective coverings for evidence of damage during shipment.

D. Accomplish unloading without contacting cable surface or protective coverings or dropping cable reels from the delivering vehicle to the ground.

E. Store wires and cables on reels on elevated hard surfaces in a clean dry locations away from construction equipment, falling objects, sources high heat and chemicals or petroleum products.

F. Seal cut cable ends using properly sized heat shrink cap to prevent moisture ingress and wicking into the cable interior.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Low-voltage single conductor wires for installation in conduit shall be as manufactured by:

1. Southwire, Carrollton, GA;
2. Prysmian/General Cable, Highland Heights, KY;
3. Okonite Company, New York, NY;
4. Or approved equal.

B. Low-voltage cable shall be as manufactured by:

1. Southwire, Carrollton, GA;
2. Prysmian/General Cable, Highland Heights, KY;
3. Belden; Indianapolis, IN
4. Okonite Company, New York, NY;
5. Or approved equal.

C. Compression connectors ring tongue type shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

D. The mineral-insulated metal sheath cable shall be as manufactured by:

a. Pentair Pyrotenax, Houston, TX;

b. AFC Cable Systems, New Bedford, MA;

c. Or approved equal.

E. Compression splices shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

F. Waterproof compression splices shall be manufactured by

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

G. Spring connector splices shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

H. Markers shall be as manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Brady, Milwaukee, WI;
4. Or approved equal.

I. Pulling lubricant shall be as manufactured by:

1. American Polywater Corporation, Stillwater MN;
2. 3M – St. Paul, MN;
3. Ideal Industries, Sycamore, IL;
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Low-voltage Voltage wire and cable

1. Low-voltage wire and cable shall be used for all power, lighting, control instrumentation, alarm and security system circuits. The size and quantity of low-voltage wires and cables shall be as indicated in the conduit and cable schedule. The conductor jacket shall be in accordance with color identification requirements specified under this Section.

2. Low-voltage single conductor wires for installation in conduit shall be in accordance with the following:
   a. Conductors shall be stranded, copper, single conductor wire conforming to ASTM B8, and B33 No. 12 AWG minimum size.
   b. Conductor insulation shall be flame-retardant, moisture and heat resistant thermoset rated 90 degrees C in dry locations and 75 degrees C in wet locations and listed by UL as type XHHW-2 or RHW.
   c. XHHW-2 shall be used for all indoor circuits and RHW for all underground and outdoor circuits.
3. Low-voltage cable for installation in conduit shall be in accordance with the following:
   a. Conductors shall be stranded, copper conforming to ASTM B8 and B33, No. 12 AWG minimum size.
   b. Conductor insulation shall be moisture and flame resistant cross-linked polyethylene rated 90 degrees C in wet and dry locations and listed by UL as type XHHW-2.
   c. Cable conductors shall be assembled together with flame and moisture resistant filters and tape to make round.
   d. Cable shall include an overall protective jacket of polyethylene compound, 45 mils minimum thickness.
4. Instrumentation cable shall in addition comply with the following:
   a. Conductors shall No 16 AWG minimum size
   b. All conductors shall be polyethylene insulated and twisted in pairs with aluminum-mylar shield overlap.
   c. Cable jacket shall be low halogen
5. Communication cable shall in addition comply with the following:
   a. Conductors shall be No 24 AWG minimum size.
   b. Conductor twist and shielding shall be as shown on the Contract Drawings or as stated in this Specification.
   c. Cable jacket shall be low halogen
6. Fire Alarm cable shall in addition comply with the following:
   a. Conductors shall 18 AWG minimum size
   b. Cables shall be UL listed for the intended service
   c. Cables intended for use in the installation shall be approved for the intended use by the New York City Building Department, Material and Equipment Acceptance Division.

7. Security system cable shall in addition comply with the following:
   a. Conductors shall be No 22, AWG minimum size.
   b. Conductor twist and shielding shall be as shown on the Contract Drawings or as stated in this Specification.
   c. Coaxial cable shall be as shown on the Contract Drawings or as stated in this Specification.
8. Mineral-insulated metal sheath cable shall be used for the fire pump circuits. The mineral-insulated metal sheath cable shall be in accordance with the following:
   a. The mineral-insulated metal sheath cable shall be NEC, type MI. The cable assembly shall be UL listed including support for a 2 hour fire rating.
   b. Conductors shall be solid copper conforming to ASTM B5.
   c. Cable insulation shall be magnesium oxide mineral rated 600 volts, 90 degrees C. The cable shall include a metal-sheath consisting of seamless soft drawn copper.
   d. The cable shall be provided with all fittings and hardware necessary for proper installation.

B. Low-voltage wire and cable accessories
1. Cable connectors shall be provided for terminating low-voltage wire and cable. Connectors shall be solder less type and properly sized to fit fastening device and wire size. Connectors shall be in accordance with the following:
   a. For wire sizes up to and including No. 6 AWG, compression type with UL 486A listing shall be used. All cable terminations for conductors No. 10 AWG and smaller shall be terminated using UL listed terminals, nylon insulated connectors, at each terminal board.
   b. For wire sizes No. 4 AWG and above, either compression type or bolted type with tin-plated contact faces shall be used.
   c. For wire sizes No. 250 kcmil and larger, connectors with at least 2 cable clamping elements or compression indents and provision for at least 2 bolts for joining to apparatus terminal shall be used.
2. Splicing for low-voltage wire and cable shall be performed when terminals are not provided. Splicing shall be in accordance with the following:
   a. For wire sizes No. 8 AWG and larger, splices shall be made up with compression type copper splice fittings with UL 486A listing. Splices shall be taped and covered with materials recommended by

the cable manufacturers, to provide insulation equal to that on the conductors.

b. For wire sizes No. 10 AWG and smaller, splices shall be made up with preinsulated, spring connectors. Connectors shall be flame retardant with UL listing. Spring connectors shall be Twister type.

c. For wet locations, splices shall be waterproofed. Compression type splices shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductor. Waterproof compression splices shall be UL listed, heavy wall type. Spring connector splices shall be UL listed and waterproofed with a sealant-filler. Spring connectors shall be Twister DB type.

3. Compression connectors shall be UL listed terminals.

4. Cable markers shall be provided for the identification of low-voltage wire and cable. Markers shall be in accordance with the following:

a. Markers shall be vinyl type, moisture, heat and abrasion resistant with adhesive back. Cable identification shall be clearly marked.

5. Low-voltage wire and cable pulling lubricant shall be used to reduce wire and cable tension and side wall pressure and aid in minimizing damage during low-voltage wire and cable installation. Pulling lubricant shall be in accordance with the following:

a. UL Listed, compatible with the wire insulation or cable jacket, the raceway involved and acceptable to the wire and cable manufacturer. When wire and cable manufacturer shall be provided.

b. Pulling lubricant shall be water based, with a 0.17 average coefficient of friction and a temperature range of 20 to 120 degrees F.

c. Pulling lubricant shall confirm to IEEE 1210

d. Pulling lubricant shall not support combustion.

e. Pulling lubricant shall not cause residue to cement insulation or jackets to the inside of conduit or ducts.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified Shop Tests:

1. Shop testing shall be performed on the low-voltage wire and cable at the manufacturer's plant prior to shipment. Shop test shall be in accordance with the latest revisions of ICEA and UL and shall demonstrate that the wire and cable tested conforms to the requirements specified.

2. The Contractor shall provide a shop test report. The report shall identify the tests performed and the results obtained.

3. All low-voltage wire and cable shall be shop tested in accordance with the requirements of this Specification.

B. Witnessed Shop Tests:

1. The Contractor shall perform witnessed shop tests in accordance with this Specification.

2. The Engineer shall have access during working hours for inspection purposes to all parts of the works where material and cable are being manufactured, and all reasonable inspection and testing facilities shall be provided to him without increase in price. The Engineer may request that dielectric strength tests and measurements be made to verify the cable data furnished by the Contractor. For this purpose the Contractor shall furnish without increase in price, a length of cable, not to exceed 3 feet for each size to be cut from one or more reels as directed by the Engineer. Each sample shall be marked with a tag bearing full description of cable insulation and number of reel from which it is cut.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All low-voltage wires and cables shall be installed within the raceways as shown on the Contract Drawings. They shall be carefully handled so as to avoid twists or kinks in the conductors or damage to the insulation.

B. The Contractor shall ensure that the manufacturer's recommended cable bending radii and pulling are not exceeded and that the number of conductors permitted in a conduit are in accordance with the latest applicable section of the NEC (NFPA 70).

C. No splices shall be permitted between terminals except at approved junction or terminal boxes. Boxes shall be provided as shown on the Contract Drawings or as required by Code for the pull lengths. No more than two terminations shall be made at each terminal point. Cable and wire runs shall be looped through pull boxes without cutting and splicing where possible. All splices below grade, in manholes, hand holes and wet locations shall be waterproofed.

D. No splicing of instrument wiring shall be permitted. Instrument wiring shall be extended by use of field termination boxes employing labeled terminal strips. Shield continuity shall be maintained. Ultimate shield termination (ground) shall be at one end only.

E. The mineral-insulated metal sheath cable manufacturer's representative shall review the cable installation to certify that the cables are installed in accordance with the manufacturer's requirements.

3.02 INSTALLATION

A. Wire and Cables

1. Cables shall be installed complete with proper terminations at both ends. For each motor circuit, Contractor shall ensure proper phasing, phase sequence and motor rotation.

2. Wire and cable contained within a single conduit shall be pulled simultaneously using insulating pulling compounds containing no mineral oil.

3. Pulling tension on wires and cables shall be continuously monitored using a calibrated Dynamometer type device, having a calibration label within six months of its use.

4. Cables shall be installed with maximum slack at all terminal points, boxes, handholes and manholes.

5. Low-voltage cables located within manholes, handholes and boxes shall be wrapped with fireproofing tape for their entire length on an individual cable basis.

   a. Tape shall be 30 mills thick of self-extinguishing material which will not support combustion.

   b. Tape shall not deteriorate when subjected to water, salt, sewage or fungus and shall be secured with glass cloth tape.

   c. Low-voltage cables shall be fireproofed in accordance with the cable manufacturer's recommendations and then covered with tape extending at least one inch into any duct.

B. Conductor Identification

1. Each conductor shall be labeled at each termination point and all splice locations. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification stamped on terminal boards when provided or the cable so it is visible around the cable's circumference.

2. Each conductor shall be identified in junction boxes, cabinets, and terminal boxes. Where no termination is made, use a plastic-coated, self-adhesive, wire marker. Where termination is made, use a plastic, pre-printed sleeve wire marker. Paper, self-adhesive wire markers shall not be used.

3. In manholes and handholes, each power conductor shall be identified by a laminated plastic tag located so that it can be seen from center of manhole without moving adjoining wires. Bundle and mark control wires as listed in conduit and cable schedule.

4. Multi-conductor control cables shall be color coded in accordance with ICEA S-58-679, Method 1, Table E

5. The following identification scheme shall be used for all low-voltage power circuits:

Voltage	Colors				
	Neutral Conductor	Phase A Conductor	Phase B Conductor	Phase C Conductor	Ground Conductor
208/120V	White	Black	Red	Light Blue	Green
240/120V	White-Gray Strip	Black-Blue Strip	Red-Blue Strip	None	Green
480/277V	Gray	Brown	Orange	Yellow	Green

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, all low-voltage wire and cable shall be field tested. The field tests shall be performed by the Contractor who shall furnish all testing equipment. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide a report identifying the tests performed and the results obtained.

B. Each electrical circuit shall be tested after permanent wires and cables are in place to demonstrate that the circuit and equipment are connected properly and will perform satisfactorily, as required, as intended, and that they are free from improper grounds and short circuits. The tests shall consist of the following:

1. Low-voltage wire and cable mechanical connections shall be individually tested after installation and before they are put in service with a calibrated torque wrench. Values shall be in accordance with manufacturer's recommendations.

2. Low-voltage wires and cables shall be individually tested for continuity between the required termination points for each ungrounded and grounded conductor. Test wire and cable after installation and before first energization or before they are put in service with an approved continuity tester. Test results shall be as recommended by the wire and cable manufacturer or in accordance with NETA ATS, NEMA, ICEA Standards.

3. Low-voltage wires and cables shall be individually tested for insulation resistance between ungrounded and grounded conductors, and from each ungrounded and grounded conductor to ground. Test wire and cable after installation and before first energization or before they are put in service with an approved insulation resistance tester, for one minute at a voltage rating recommended by the cable manufacturer or in accordance with NETA ATS, NEMA, and ICEA Standards.

4. The insulation resistance for any given conductor shall not be less than the value recommended by the cable manufacturer or in accordance with NETA ATS, NEMA and ICEA Standards. Any cable not meeting the

recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.

5. Shielded instrumentation cable shields shall be tested with an ohmmeter for continuity along the full length of the cable and for shield continuity to ground.

6. Connect Shielded instrumentation cables shall be connected to a calibrated 4-20 milliamp DC signal transmitter and receiver. Test at 4, 12, and 20 milliamp transmitter settings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 05 27 – GROUNDING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing grounding.

1. Grounding shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The grounding Work shall be a complete system for the electrical and instrumentation systems, structures and equipment. The Work shall include grounding of all electrical equipment, transformer neutrals, equipment enclosures, grounding electrodes, fences, and gates.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 20 – Low -Voltage Wires, Cables and Accessories

B. Section 26 05 33 – Raceways and Boxes for Electrical Systems

1.04 REFERENCES

A. Definitions

1. Grounding

a. Grounding and grounding system shall be used interchangeable in this Section and the Specifications to mean, the means and methods by which all electrical and instrumentation systems are grounded for the purposes of attaining safety grounding, equalization of ground potential, reducing ground potential rises during fault events and the grounding of the ungrounded conductor as required by the NEC (NFPA 70) and Electric Utility Standards

2. Electric Utility

a. All references to the Electric Utility shall mean the Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

1.	ASTM B8	-	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft
2.	NEC (NFPA 70)	-	National Electrical Code
3.	Electric Utility	-	Standards and Guidelines
4.	UL 467	-	Electrical Grounding and Bonding Equipment

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The grounding system maximum resistance shall not exceed 5 ohms under normally dry conditions. All structures and metal equipment containing electrical apparatus shall be connected to ground.

All grounding associated with the service feeders shall be in accordance with the requirements of the Electric Utility.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's catalog cuts for the grounding materials proposed for use.

3. Scaled Shop Drawings showing proposed routing and layout of the grounding system.

B. Field test report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The grounding equipment shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ground cable shall be as manufactured by:

1. Erico, Solon, OH;
2. Harger, Grayslake, IL;
3. Prysmian/General Cable, KY;
4. Or approved equal.

B. Ground rods shall be as manufactured by:

1. Erico, Solon, OH;
2. Harger, Grayslake, IL;
3. Blackburn/Thomas and Betts, MN;
4. Thompson Lightning Protection Inc, MN;
5. Or approved equal.

C. Bolted or compression grounding connectors shall be as manufactured by:

1. Burndy, Manchester, NH;
2. Harger, Grayslake, IL;
3. Thomas and Betts, Memphis, TN;
4. Or approved equal.

D. Welded grounding connections shall be as manufactured by:

1. Cadwell, Solon OH;
2. Harger, Grayslake, IL;
3. Or approved equal.

E. Ground Resistance Tester shall be as manufactured by:

1. Fluke, Everett, WA.
   a. Model 1625-2 GEO or approved equal.
2. Megger, Dallas, TX.
   a. Model DET 2/3 or approved equal.
3. AEMC Instrument, Dover, NH.
   a. Model 6471 or equal
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Ground Cable

1. The ground cable shall be soft drawn bare stranded copper conforming to ASTM B8, No. 8 AWG minimum size.
2. The insulated cable for equipment grounding shall conform to the requirements of Section 26 05 20 – Low-Voltage Wires, Cables and Accessories.

B. Ground Rods

1. Ground rods shall be stainless steel, 3/4-inch diameter and 10 feet long.
2. Ground rods shall have a drive point at the lower ends. The upper end of each rod shall be equipped with bronze, clamp type connectors with not less than four bolts.

C. Grounding Connectors.

1. Compression connectors shall be heavy duty copper. Bolted connectors shall be copper alloy castings, designed specifically for the items to be connected, and assembled with Durium or silicone bronze bolts, nuts and washers.
2. Welded connections shall be by exothermic process utilizing molds, cartridges and hardware designed specifically for the connection to be made.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. The Contractor shall tie into the existing ground system.

B. Equipment shall be connected in accordance with the details shown on the Contract Drawings. All steel column and underground connections shall be welded except for test points.

C. Metal casings or supporting frames of electrical equipment, such as transformers, panel boards, control panels, and individual motor controllers shall be grounded. The equipment shall be thoroughly grounded to the facility grounding system. All metal conduits leaving all electrical equipment shall be grounded. Grounding type fittings shall be installed on flexible conduits.

D. An insulated cable for equipment grounding shall be installed with the phase conductors within the conduit for the nominal 120 volt and higher power, lighting and control circuits.

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, the ground system shall be field tested for operation and conformance. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

1. Resistance testing shall be made using approve Earth Ground Resistance Testers not less than 48 hours after rainfall.

    a. Resistance values above 5 ohms shall be brought to the Engineer's attention with remedial recommendations.

2. Grounded cables and metal parts shall be continuity tested. The conduit system shall be ground tested in accordance with the requirements of Section 26 05 33 – Raceway and Boxes for Electrical Systems.

B. The Contractor shall provide a Field Test Report, the report shall identify the testing performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing supporting devices.

1. Supporting devices shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The supporting devices shall be a complete system for the equipment.

3. The Work shall include providing all required support devices to properly mount and secure all equipment furnished under this Contract.

B. This Section also includes equipment anchorage and restraints suitable to meet the specified seismic requirements.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 33 - Raceways and Boxes for Electrical Systems

1.04 REFERENCES

A. Supporting devices shall comply with the latest applicable provisions and recommendations of the following:

1. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, Low- Alloy, High-Strength, Low-Alloy with Improved Formability, and Ultra-High Strength
2. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
3. MFMA 103 - Guidelines for the Use of Metal Framing
4. MFMA 4 - Metal Framing Standards Publication
5. ASTM A123 and A153 – Hot Dipped Galvanized Finish
6. ASTM B117 – Salt Fog Spray Test
7. ASTM A1046 and 1059 - Defender Finish

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General

1. All channels, fittings and hardware used in the supporting system shall be in accordance with MFMA 4 and MFA 103.
2. The design of the support system shall be the responsibility of the Contractor. The Contractor shall provide the proper sized rods, channels, fittings, brackets and appurtenances necessary to adequately support the equipment.
3. The Contractor shall retain the services of a licensed Professional Engineer, registered in the State of New York, to prepare support details for equipment exceeding 50 pounds in weight. The Professional Engineer shall stamp the support system design details.

B. Seismic Requirements

1. Equipment assemblies such as secondary unit substations, switchgear, transformers, motor control centers and panelboards shall be certified to meet seismic requirements of the New York City Building Code.
2. The Contractor shall provide equipment anchorage details for all equipment certified to meet seismic requirements. The details shall be coordinated with the manufacturer's equipment mounting provisions.

3. Electric conduit shall include seismic restraints in accordance with the requirements of Section 26 05 33 – Raceways and Boxes for Electrical Systems.

4. The Contractor shall retain the services of a licensed Professional Engineer, registered in the State of New York, to prepare the seismic anchorage and restraint details. The Professional Engineer shall stamp the seismic anchorage and restraint details.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for approval by the Engineer.

B. Submittals shall include, but not be limited to the following:

1. Manufacturer's catalog cuts for the supporting devices proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.

2. Scaled Shop drawings showing dimensions and locations of all items and clearance requirements.

3. Support design details and equipment seismic anchorage and restraint details, stamped by a Licensed Engineer as required.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The supporting devices shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Supporting devices shall be manufactured by:

1. B-Line, Highland, IL;

2. Atkore Unistrut/Power Strut, Harvey, IL;

3. Thomas and Betts Kindorf, Memphis, TN;

4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Channels, Fittings and Brackets

1. The Contractor shall provide channels, fittings, brackets and related hardware for mounting and supporting the electrical equipment. Anchor bolts, concrete inserts and related hardware for proper support of equipment shall also be provided. All equipment necessary to meet the seismic requirements specified shall be provided.
2. Channels shall conform to ASTM A1011/A1011M. Channels shall have a minimum thickness of 12 gauge. The cross sectional width dimension shall be 1-1/2 inch minimum. The depth shall be as required to satisfy load requirements.
3. Attachment holes, when required, shall be factory punched on hole centers approximately equal to the cross sectional width and shall be 9/16 inch diameter.
4. Fittings and brackets shall have 9/16 inch diameter holes on centers identical to the channel or as required to align with the channel holes. Fittings and brackets shall have the same width as the channel and shall be 1/4 inch thick minimum. Fittings and brackets shall mate properly with the channel.
5. All channels, fittings, brackets and related hardware shall be steel and have an electro-plated zinc; for wet areas, outdoor locations, roofs or vents use hot dipped galvanized or defender with self-healing properties finish according to ASTM B633, ASTM A123 and A153, ASTM B117, ASTM A1046 and ASTM A1059.
6. In corrosive and classified areas, channels, fittings, brackets and related hardware shall be type 316 stainless steel or PVC coated. Dissimilar metals shall be avoided when installing stainless steel channels or PVC coated .

B. Conduit Hangers, Supports and Inserts

1. The Contractor shall provide channels, rods, straps, anchors and related hardware for support of the exposed electric conduit system.
2. The Contractor shall also provide anchor bolts, concrete inserts and related hardware for proper support of equipment. All equipment necessary to meet the seismic requirements specified shall be provided.
3. Conduit hangers, supports and inserts shall be in accordance with Section 26 05 33 – Raceway and Boxes for Electrical Systems.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. All supporting devices shall be installed level, parallel and perpendicular to building walls and floors, such that the support system is installed in a neat and professional manner.

B. All holes in hung ceilings for support rods and other equipment shall be made adjacent to bars where possible, to facilitate removal of ceiling panels.

C. The channels, fittings and brackets shall be rigidly bolted together and braced to make a substantial supporting framework support system.

D. Where motor control centers, switchgear, unit substations and other electrical equipment is being installed on concrete pads, the Contractor shall furnish leveling channels to the General Contractor. The General Contractor shall install the leveling channel in the concrete pads. Seismic certified equipment shall be anchored in accordance with the seismic anchorage details.

E. All equipment fastenings to steel columns, beams and trusses shall be by beam clamps. In lieu of beam clamps, equipment may be welded to steel structures, subject to Engineer approval.

F. No holes shall be drilled in any steel columns, beams and trusses.

G. Hanger rod supports shall be installed such that threaded rod is parallel to building walls and perpendicular to floors.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing conduit system.

1. The conduit system shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The conduit system required shall be provided with all rigid and flexible conduits, boxes, fittings, supports, hangers and inserts and other conduit accessories as required for the installation of the electric wire and cable.

B. The following index of this Section is presented for convenience:

C.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	13
2.04	Source Quality Control / Shop Tests	13
PART 3	EXECUTION	13
3.01	Examination / Preparation	13
3.02	Installation	14
3.03	Field Testing / Quality Control	19
3.04	Startup / Demonstration	19
3.05	Adjusting / Protection / Cleanup	20

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 23.02 - Miscellaneous Metal Fastening

B. Section 09 91 00 - Painting

C. Section 40 05 07 - Hangers and Supports for Process Piping

1.04 REFERENCES

A. Definitions

1. Conduit System: Shall mean a complete installation comprising all rigid conduit and flexible connections, boxes, fittings, supports, hangers, inserts and other conduit accessories as required for the installation of electric wires and cables.

2. Conduit Accessories: Shall mean all fittings required to ensure a complete conduit system installation. Conduit accessories shall include, but is not limited to, expansion, deflection, seal and drain fittings, hubs, bushings, duct seal, tags, markers, thruwall seals and bushings.

B. References

1. Electric conduit system shall comply with the latest applicable provisions and recommendations of the following:

2. NEC (NFPA 70) - National Electrical Code

3. UL 6 - Electrical Rigid Metal Conduit - Steel

4. UL 360 - Standard for Liquid-Tight Flexible Metal Conduit

5. UL 514A - Metallic Outlet Boxes

6. UL 514B - Conduit, Tubing and Cable Fittings

7. ANSI C80.1 - Electric Rigid Steel Conduit

8. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion

9. ASTM D1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

10. NEMA RN-1 - PVC Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

11. ASTM-2247 - Standard Practice for Testing Water Resistant Coating Using 100% Relative Humidity

12. ETL-PVC 001 - PVC Externally Coated Galvanized Conduit PVC Coating Verified for Adhesion

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the Contract.
2. Manufacturer's catalog cuts for the conduit, boxes, fittings and supports proposed for use.
3. Construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed by a licensed Professional Engineer, registered in the State on New York.
4. Scaled Shop Drawings showing proposed routing of all conduits, inclusive of conduits embedded in structural concrete and conduits directly buried in earth.
5. Scaled Shop Drawings showing locations of pull and junction boxes and all penetrations in walls and floor slabs.
6. Field test report.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Electric conduit system shall be delivered, stored and handled in accordance with the Specifications, the manufacturer's instructions and the following:

1. Conduit shall be delivered to the Site in standard bundles having each length suitably marked with the manufacturer's name or trademark and bearing the label of the Underwriters' Laboratories, Incorporated inspection service.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Rigid steel conduit shall be as manufactured by:

1. Atkore/Allied Tube and Conduit Corporation, Harvey, IL;
2. Wheatland Tube Company, Sharon, PA;
3. Republic Conduit, Louisville, KY;
4. Or approved equal.

B. PVC coated rigid steel conduit shall be as manufactured by:
1. Robroy Industries, Gilmer, TX;
2. OCAL by Thomas & Betts, Memphis, TN;
3. Atkore/Calbond, Harvey, IL;
4. Or approved equal.

C. Hangers, Supports and Inserts shall be as manufactured by:
1. B-Line, Highland, IL;
2. Atkore Unistrut / Power Strut Harvey, IL
3. Kindorf, Harahan, LA;
4. Or approved equal.

D. Flexible conduit shall be as manufactured by:
1. Anaconda American Brass Company, Rolling Meadows, IL;
2. Atkore AFC Cable New Bedford MA
3. Electric-Flex Company, Roselle, IL;
4. Or approved equal.

E. Hazardous area flexible conduit shall be as manufactured by:
1. Crouse Hinds Company, Syracuse, NY;
2. Appleton Electric Company, Rosemont, IL;
3. Or approved equal.

F. Unions in hazardous locations shall be as manufactured by:
1. Crouse-Hinds Syracuse, NY;
2. Atkore/Calbond/Calbrite, Harvey, IL;
3. Or approved equal.

G. Unions in non-hazardous areas shall be as manufactured by:
1. Thomas & Betts, Memphis, TN;
2. Or approved equal.

H. Expansion and deflection fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;

2. Atkore/Calbond, Harvey, IL;
3. Appleton Electric, Rosemont, IL;
4. Or approved equal.

I. Sealing fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;
2. Appleton Electric, Rosemont, IL;
3. Or approved equal.

J. Drain fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;
2. Atkore Calbrite, Harvey, IL;
3. Appleton Electric, Rosemont, IL;
4. Or approved equal.

K. Conduit hubs shall be as manufactured by:
1. O-Z/Gedney Rosemont, IL;
2. Atkore/Calbond, Harvey, IL;
3. Thomas and Betts, Memphis, TN;
4. Or approved equal.

L. Conduit bushings and locknuts shall be as manufactured by:
1. a. O-Z/Gedney, Rosemont, IL;
2. b. Thomas and Betts, Memphis, TN;
3. c. Or approved equal.

M. Duct seal shall be as manufactured by:
1. American Polywater Corp, Stillwater, MN;
2. O-Z/Gedney, Rosemont, IL;
3. Ideal Industries, Sycamore, IL;
4. Or approved equal.

N. Thruwall seals shall be as manufactured by:
1. O-Z/Gedney Rosemont, IL;
2. Or approved equal.

O. Floor seals shall be as manufactured by:
1. O-Z/Gedney, Rosemont, IL.;
2. Or approved equal.

P. Sealing bushings shall be as manufactured by:

1. O-Z/Gedney, Rosemont, IL;
2. Or approved equal.

Q. Fire stop fittings shall be as manufactured by:

1. O-Z/Gedney, Rosemont, IL;
2. Or approved equal.

R. Thru-wall barriers shall be as manufactured by:

1. Crouse-Hinds, Syracuse, NY;
2. Or approved equal.

S. Conduit tags shall be as manufactured by:

1. Seton Nameplate Corporation, Branford, CT;
2. Or approved equal.

T. Conduit markers shall be as manufactured by:

1. Thomas and Betts, Memphis, TN;
2. Or approved equal.

U. Terminal blocks shall be as manufactured by:

1. Allen-Bradley Company, Milwaukee, WI;
2. ABB, Fairfield, CT;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Rigid Steel Conduit

1. The Contractor shall provide rigid steel conduit. All steel conduit shall comply with the requirements of ANSI C80.1, and UL 6.
2. Both the inside and outside surfaces of the rigid steel conduit shall be protected against corrosion by a coating of zinc applied by the hot-dip galvanizing process.
3. Conduits, elbows and couplings shall be rigid, heavy wall, mild steel, hot dip galvanized. Conduits, elbows and couplings shall have a smooth interior with tapered threads and carefully reamed ends. Conduit size shall be 3/4-inch minimum and shall conform to UL 6.
4. Conduits, elbows and couplings shall include a PVC coating for all areas. For conduits located indoors in dry, dusty areas the use of rigid steel conduit without PVC coating shall be permitted.
5. PVC coating of conduit shall be factory applied and shall include a smooth 2 mil thick urethane interior coating and 40 mil thick polyvinyl chloride

exterior coating. PVC coated conduit shall conform to NEMA RN-1, ASTM D870, ASTM D1735, ETL-PVC 001, and UL 6. The exterior PVC coating color shall be gray and listed UL DYJC. The threads of conduits that have been cut in the field to size shall have the same PVC coating applied.

B. Hangers, Supports and Inserts

1. The Contractor shall provide hangers, supports and inserts for support of the electric conduit system. The supports shall securely attach the electric conduit system to the channel and structure.

2. The electric conduit system shall be designed, constructed and installed suitable for earthquake regulations in accordance with the seismic requirements of the New York City Building Code and the Uniform Building Code for Zone 2A application.

3. Transverse and longitudinal bracing shall be provided as required to brace the electric conduit for the seismic requirements specified.

4. All drilled in type concrete inserts shall be expansion shields or anchors conforming to Section 05 05 23.02 – Miscellaneous Metal Fastenings and 40 05 07 - Hangers and Supports for Process Piping. In corrosive and Class 1 and Division 1 locations, concrete inserts shall be 316 stainless steel.

5. Hangers and supports shall be in accordance with the requirements of Section 40 05 07 - Hangers and Supports for Process Piping except beam clamps, hanger rods and hardware shall be steel with electro-plated zinc finish, hot dipped galvanized or defender finish. This shall also include bolts, nuts and washers. In corrosive locations, hangers and support hardware shall be type 316 stainless steel or factory applied 40 mil thick PVC coated.

C. Flexible Metallic Conduit

1. The Contractor shall provide flexible metallic conduit where required to permit movement of connected devices and where it is impracticable to complete runs with rigid conduit subject to the limitations imposed by the NEC (NFPA 70).

2. Flexible conduit used indoor in non-hazardous dry dusty areas shall be non-liquid-tight, with a steel core.

3. Flexible conduit used indoors/outdoors and in non-hazardous, wet and corrosive areas shall be UL Listed and include a hot dipped galvanized steel core with a liquid-tight, polyvinyl chloride cover and shall include a built-in copper ground for sizes 3/4-inch through 1-1/4 inch.

4. For hazardous areas flexible conduit shall include a brass inner core with a bronze outer braid and protective neoprene plastic coating. End fittings shall be steel, brass or bronze.

D. Outlet Boxes and Fittings

1. The Contractor shall provide outlet boxes and fittings for rigid and flexible conduit. The outlet boxes and fittings required for the work which constitutes a part of the conduit system, shall be of approved types.
2. Fittings, bodies and boxes installed on PVC coated conduits shall have interior and exterior PVC coatings equivalent and corresponding to that of the conduit on which they are installed and shall be NEMA 4X rated.
3. For outdoor, wet and corrosive areas, conduit fittings and outlet bodies shall be cast gray iron alloy, cast malleable iron bodies and covers. All units shall be gasketed, watertight, and threaded with five full threads and shall have rust-proofing in accordance with the requirements of this Section.
4. Threaded cast ferrous metal, hub type outlet boxes shall be used throughout, except in the interior walls of superstructures and in roof slabs protected by built-up roofing where pressed steel boxes shall be installed. Cast iron or alloy outlet boxes of the proper size and depths for the application, complete with watertight gaskets and covers secured by brass screws, shall be furnished and installed as indicated on the Contract Drawings or as required by the conduit run. Outlet boxes, furnished and installed for the installation of lighting fixtures, switches and receptacles in a future contract, shall be furnished with watertight gaskets and blank covers.
5. For non-hazardous, indoor dry dusty areas pressed steel boxes of the proper size and depths for the application shall be provided. Boxes shall be rated NEMA 12, not less than No. 14 U.S. Standard Gauge (0.078 inch). The conduit openings shall be provided with oil-resistant gaskets. Conduits shall be fastened to these boxes with locknuts and bushings, and all unused outlets or holes shall be left sealed.
6. All outlet boxes intended for the support of fixtures shall be provided with approved fixture studs.
7. For concealed conduit runs in outside walls and all exposed conduit work, connections to boxes and fittings shall be made through threaded holes, unless otherwise approved by the Engineer. For concealed conduit work in non-hazardous areas in other than outside walls, connections between conduit and boxes may be made with drilled holes, using locknuts and bushings.
8. Where necessary unions may be used.
    a. In non-hazardous locations unions shall be universal or Erickson
    b. In hazardous locations unions shall be type UNF, UNL or YNY.
9. All boxes installed for concealed conduit, shall be provided with extension rings or plaster rings and covers as required. For non-hazardous, dry indoor areas stainless 302/304, 306, satin beveled steel cover and device plates for surface mounted boxes shall be used. For corrosive locations, galvanized ferrous and galvanized cast ferrous metal cover and device plates with neoprene gaskets shall be used.

10. Outlet boxes and fittings installed on PVC coated conduit shall also include interior and exterior coatings equivalent to the conduit. Dissimilar metals shall be avoided.

E. Conduit Accessories

1. The Contractor shall provide conduit accessories for use with the conduit system. The conduit accessories shall be of approved types.

2. Expansion and Deflection Fittings:

   a. Expansion and deflection fittings shall be made up of non-corrodible parts and shall provide for ample longitudinal and lateral movement. A suitable bond shall provide a low resistance, continuous longitudinal path for ground currents.

   b. Expansion and deflection fittings shall be watertight cast iron, malleable iron or hot dipped galvanized. Fittings shall be corrosion-resistant, UL listed and compatible with the conduit system.

   c. Expansion /deflection fittings shall provide both expansion and deflection in a single fitting in accordance with the following:

      1) Axial expansion or contraction up to 3/4-inch.

      2) Angular misalignment up to 30 degrees.

      3) Parallel misalignment up to 3/4-inch.

      4) Expansion fittings shall provide expansion /contraction with eight-inch total movement.

3. Sealing Fittings:

   a. Sealing fittings shall be cast gray iron alloy or cast malleable iron or copper free aluminum with zinc electroplate and lacquer or enamel finish.

   b. Sealing fittings shall have an ample opening with threaded closure for access to conduit hub for making dam. Sealing fiber and compound shall be suitable for use with the fitting and shall be the products of the fitting manufacturer.

   c. For corrosive locations, seal fittings shall include interior and exterior coatings equivalent to the PVC conduit coating specified under this Section. Dissimilar metals shall be avoided.

4. Drain Fittings:

   a. Drain fittings shall be a combination device designed to provide ventilation to minimize condensation and drains accumulated condensate.

   b. The combination drain/breather fitting shall be 3/8 inch male thread size with stainless steel body.

5. Conduit Hubs:
   a. Conduit hubs shall be threaded, insulated throat type with bonding screw locknut.
   b. The conduit hub and locknut shall be malleable iron or zinc and shall include a 90-degree C insulating surface and a sealing ring for a water tight and dust tight connection. Dissimilar metals shall be avoided.
6. Conduit Bushings:
   a. Conduit bushings shall be insulated, grounding type with lay-in-lug connection. Two locknuts shall be provided for each bushing.
   b. The conduit bushing and locknuts shall be steel, malleable iron or zinc. The bushing shall include a 90 degrees C insulating surface.
7. Duct Seal:
   a. Duct seal shall be a suitable for forming a water and gas tight seal between cables and conduits.
   b. Completed seal shall be resistant to gasoline, oils, dilute acids and bases.
   c. The completed seal shall be capable of blocking water pressure of at least 10 psi.
8. Thruwall Seals and Bushings:
   a. New Construction
      1) WSK and WCSC type thruwall seals shall be used for conduits and cables passing through exterior subsurface walls and exterior concrete walls.
      2) CSMI type seal bushings at the inside and CSMC type seal bushings at the outside of the structure in the same core bit-drilled hole shall be used for conduits passing through interior concrete wall, interior floors, interior block walls, exterior block walls, exterior subsurface walls, exterior concrete walls, floor slabs.
      3) CFS and or CFSI type fire stop fittings shall be used for conduits passing through fire rated floors and walls.
      4) TW type thru wall type barriers shall be use for multiple conduit runs passing through interior or exterior and fire rated walls.
   b. Existing Construction
      1) SK and FSCS type seals shall be used for conduits and cables passing through concrete floors and floor slabs.

2) CSMI type seal bushings at the inside and CSMC type seal bushings at the outside of the structure in the same core bit-drilled hole shall be used for conduits passing through interior concrete wall, interior floors, interior block walls, exterior block walls, exterior subsurface walls, exterior concrete walls, floor slabs.

3) CFS and or CFSI type fire stop fittings shall be used for conduits passing through fire rated floors and walls.

4) TW type thru wall type barriers shall be use for multiple conduit runs passing through interior or exterior and fire rated walls.

9. Conduit Tags:

a. Conduit tags shall be 19 gauge, 1-1/2-inch diameter round brass which shall be secured to the conduit with annealed brass wire.

b. Conduit tags shall be clearly stamped with the conduit number in conformity with the conduit and cable schedule or as directed by the Engineer.

10. Conduit Markers:

a. Conduit identification markers shall be self-sticking color-coded tape. Identification tape shall be two inches wide and colored in accordance with the color banding specified under this Section.

F. Terminal, Junction and Pull Boxes.

1. The Contractor shall provide terminal, junction and pull boxes as shown on the Contract Drawings and where otherwise required, or as directed by the Engineer.

2. Boxes located indoor in dry, dusty areas shall be NEMA Type 12, constructed of welded and galvanized sheet steel. Boxes of dimensions 24 inches and less shall be 14 USS standard gauge metal. Boxes of dimensions greater than 24 shall be 12 USS standard gauge metal, except 10 USS standard gauge shall be used for boxes with any dimension of 36 inches or more. Boxes located in other areas shall conform to the following area classifications:

a. For wet locations boxes shall be watertight NEMA Type 4. Boxes shall be constructed of galvanized cast iron and shall include gasketed, bolt on covers, with tapped holes in bosses or hubs for conduit entrance. Boxes shall be provided with cast mounting lugs for installation in concrete.

b. For hazardous locations boxes shall be explosion proof NEMA Type 7. Boxes shall be constructed of cast iron and shall include threaded connections and ground joint surfaces.

c. For corrosive locations boxes shall be corrosion resistant, NEMA Type 4X. Boxes shall be constructed of 316 stainless steel material with sealed seams.

3. Pull and junction boxes shall be provided with covers held in place by brass screws. Terminal boxes shall be provided with terminal block supports and approved hinged covers fitted tightly against a gasket and secured by lug bolts and wing nuts. Hinges, lug bolts, wing nuts and other fittings shall be made of an approved, non-ferrous, non-corrodible metal. All boxes shall be provided with rabbeted gaskets or flange gaskets securely held in place.

4. Tapping for threaded connections to outlet boxes, junction boxes, pull boxes and conduit fittings in non-explosion proof construction shall conform to the following:

   a. All threads shall be tapered.

   b. If threads for connection of conduit are tapped all the way through a hole in an enclosure, or if an equivalent construction is employed, there shall be not less than 3-1/2 threads in the metal and the construction of the enclosure shall be such that a suitable conduit bushing can be properly attached.

   c. If threads for connections of conduit are not all the way through a hole in a box wall, conduit hub or the like, there shall be not less than five full threads in the metal and there shall be a smooth, well rounded inlet hole for the conductors, which shall afford protection to the conductors equivalent to that provided by a standard conduit bushing and which shall have an internal diameter approximately the same as that of the corresponding trade size of rigid conduit. The threaded hole shall be provided with a conduit end stop.

   d. Tapping for threaded connections for explosion proof construction shall conform to the requirements of the NEC (NFPA 70) for construction in Class I, Division 1, and hazardous locations.

5. Cast iron or cast ferrous alloy outlet boxes, junction boxes, pull boxes, conduit fittings and conduit accessories such as box covers shall be rust-proofed by zinc coating applied by the "hot-dip" process or shall be given a rust protective coating applied by either of the following methods:

   a. Method A:

      1) Castings shall be given a mechanical and chemical cleaning.

      2) Castings shall be given a phosphoric acid type dip.

      3) Then a coating of zinc chromate primer shall be applied, and finally

      4) A coating of baked enamel finish shall be applied over the outside and inside surfaces of the castings.

b. Method B:

1) Castings shall be given a mechanical and chemical cleaning.

2) Then a coating of cadmium shall be deposited electrolytically.

3) Then a coating of zinc shall be applied by electroplating.

4) Then a vinyl resin base aluminum lacquer shall be applied.

6. Stamped steel outlet boxes, junction boxes and box covers shall be rust-proofed by a zinc coating applied by an electro-galvanizing or sherardizing process. Fabricated sheet steel boxes shall be formed from galvanized sheet steel. Welded joints shall be touched up with aluminum lacquer and boxes and covers shall be given a shop priming coat of zinc chromate rust inhibiting paint.

7. Terminal blocks shall be used within terminal boxes for termination of prepared conductors No. 10 AWG and smaller. Terminal blocks shall be in accordance with the following:

a. Terminal blocks shall be high density, screw terminal type suitable for rail mounting with quantities sufficient for the conductors to be terminated plus 20 percent spare.

b. Terminal blocks shall be NEMA rated, 600 volt, 35 ampere suitable for 85 degrees C.

c. Terminal block components shall have stainless steel and tin plated copper alloy components, backed out captive screws and marking surface.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All conduits shall be installed in accordance with the requirements specified under this Section and in conformity with the sizes stated in the Specifications or shown on the Contract Drawings. They shall be installed complete with all accessories, fittings and boxes, in an approved and workmanlike manner so as to provide proper raceways for electrical conductors.

B. The Contractor's attention is called to the fact that all conduit runs indicated on the Contract Drawings are shown diagrammatically for the purpose of outlining the general method of routing the conduits to avoid interference. Where conduit runs

are not shown, it shall be the responsibility of the Contractor to establish the runs required based upon the various systems shown on the Contract Drawings.

C. Should any structural difficulties prevent the setting of cabinets, boxes, conduits, etc., at points shown on the plans, deviations therefrom as determined by the Engineer will be permitted and shall be made without additional cost.

D. All exposed steel conduits, fittings, boxes, straps, racks and hangers shall be painted in conformity with Section 09 91 00 - Painting. PVC coated conduit systems shall not be painted. Paint shall match the gray color of the PVC coated conduits.

E. Conduits shall be tagged using conduit tags. Conduit tags shall be installed where conduits terminate in equipment and enclosures.

F. Exposed conduits shall be color banded using conduit markers. Markers shall also include operating voltage when over 600 volts. Conduit markers shall be installed 360 degrees, double wrap around conduit exterior. Conduit markers shall be installed where conduits enter equipment, boxes, within each room, at wall penetrations and 50 feet on centers in each area. When exposed conduits are to be painted, markers shall be installed after the conduits are painted. Color banding shall be in accordance with the following:

1. 120/208 volt AC: Gray.
2. 277/480 volt or 480 volt AC: Sand.
3. 4160 volt AC: Silver.
4. 13800 volt AC: Brown.
5. Fire Detection and Alarm: Red.
6. Telephone: Blue.
7. Intercommunication: Yellow.
8. Security System: Rust.
9. Low Voltage Switching, Instrumentation and Controls System: Black.

G. All enclosing cases, including condulets and conduit bodies, for fire, sprinkler, smoke detection, and associated systems alarm apparatus and equipment shall be painted or colored Fire Department “RED”, in accordance with New York City Building Code, unless otherwise required by the local Authority Having Jurisdiction (AHJ).

3.02 INSTALLATION

A. Installation of Raceways

1. The Contractor shall install all exposed raceways parallel or at right angles to walls and ceiling beams. Changes in directions shall be made with bends, elbows and pull boxes. All parallel runs shall be spaced uniformly throughout and secured in place with hangers and fasteners. Brace raceways to satisfy the specified seismic requirements in accordance with the restraint details.

2. Conduits, where exposed, shall in all cases be substantially supported in an approved manner, but they shall not be fastened to or come in contact with any other pipes, ducts or other work of a similar nature. In all exposed work, approved channel or angle iron hangers, racks, one-hole straps or a combination thereof shall be provided to support the conduits. Where conduits are supported with one-hole straps, spacers shall be used to provide 1/4-inch minimum clearance between the conduits and walls or ceilings.

3. Hanger rods for trapeze type hangers shall be not less than 3/8 inch diameter. Conduit supports shall be located at intervals not exceeding 8 feet. Conduits shall be securely fastened to each support with U-bolts, straps or clamps.

4. All concealed conduits shall be placed in walls, floors, ceilings or slabs at the proper time in accordance with the progress of the structural Work. The Contractor shall cooperate in every respect in meeting schedules and shall not delay the structural Work unnecessarily.

5. Conduits embedded in concrete shall be blocked and braced in place by use of adequate conduit separators to prevent displacement during the pouring of concrete. The Contractor will be held responsible for proper position of conduits and shall rearrange any conduit that may be displaced while concrete is poured, without additional cost.

6. Where conduit runs are to be concealed and the Contractor fails to place such conduit in sufficient time to be included in the structures and the structures are completed without such conduit, the Contractor shall install such runs either concealed or exposed as directed by the Engineer, with no extra payment for additional work or for more conduit than the original lengths.

7. Embedded conduit shall be run in structural concrete in the center of slabs and walls and above waterstops. Conduit connections shall be made watertight. Contractor shall confirm that concrete thickness is sufficient for embedding the quantity of conduits intended. Unless specifically shown otherwise on the Contract Drawings or stated in the this Specification or the Specifications, embedded conduits shall be in accordance with the following criteria:

    a. Minimum concrete thickness shall be as follows:

        1) For concrete 16 inches thick and less, the minimum concrete thickness shall be 11.5 inches plus the depth of the largest conduit assembly. The conduit assembly depth shall be from the top of the uppermost conduit to the bottom of the lowest conduit.

        2) For concrete greater than 16 inches thick, the minimum concrete thickness shall be 13.5 inches plus the depth of the largest conduit assembly.

3) For concrete at foundation slabs, an additional inch shall be added to the minimum concrete thicknesses previously stated.

b. Conduit spacing shall be as follows:

1) Conduits shall be separated three times outer diameter of larger conduit center to center.

2) For multiple conduit layer assemblies, conduits shall be separated vertically three times outer diameter of larger conduit center to center.

3) When conduits cross at a given point, the conduits may be in direct contact and the angle of cross shall be 45 degrees or greater. Conduits may also cross within the vertical spacing of a multi-conduit layer assembly.

4) When conduits cross a structural expansion joint, conduits shall be separated three times outer diameter of larger conduit fitting center to center.

8. A run of conduit between outlet and outlet, between fitting and fitting or between outlet and fitting shall not contain more than the equivalent of three quarter bends, including those bends located immediately at the outlet or fitting.

9. Factory-made conduit bends or elbows shall be used wherever possible in making necessary changes in direction. Field bends shall be carefully made so as to prevent conduit damage or reduction in the internal areas. The radius shall not be less than six times the nominal diameters for the conduit with carefully matched bends on parallel runs so as to present a neat appearance.

10. All conduits, where cut, shall be carefully reamed to remove burrs. No running threads will be permitted. All screw joints shall be watertight. Conduits shall be fitted in an approved manner to all devices and boxes. The ends of all conduits shall be equipped with suitable approved conduit fittings. The ends of all empty conduits shall stub up six inches above the slab and shall be capped.

11. As far as practicable, conduits shall be pitched to drain to outlet boxes or otherwise so installed as to avoid trapping moisture. Trapped conduits in concealed construction shall be provided with outlet boxes for drainage. Where necessary drainage in outlet boxes or where dips are unavoidable in exposed conduits, a drain fitting shall be installed at the low point.

12. Thruwall type seals and conduit sealing bushings shall be installed for all conduits passing through concrete slabs, floors, walls or block walls.

13. Conduit runs shall be installed so as to avoid flues, heat sources, and steam or hot water pipes. A minimum separation of 12 inches shall be maintained where conduit crosses or parallels hot water, steam pipes or heat sources.

14. Where conduit enter or leave equipment located within electrical and control rooms the conduit shall be sealed and packed with a suitable duct seal compound.

15. A 250 pound tested polyethylene pull tape shall be provided in all empty conduits, with a minimum 8 inch of slack, double backed into the conduit. Conduit shall be protected immediately after installation by installing flat non-corrosive metallic discs and steel bushings designed for this purpose at each end. Discs shall not be removed until it is necessary to clean the conduit.

16. All conduit that is cut on the job shall be cut square and taper reamed to remove burrs before installation. Where steel conduit is cut and threaded on the site, it shall be coated before and after making connections.

17. PVC coated conduit shall be installed in compliance with the latest version of the National Electrical Code and other applicable codes and standards as indicated in these specifications.

18. PVC coated conduit shall be installed in accordance with NECA National Electrical Installation Standards (NEIS) 101. Standards for installing steel conduit.

19. Conduits embedded in concrete shall stub up 6 inches above the slab. A three inch high curb extending three inches from the outer surface of the conduit penetrating the floor shall be provided to prevent corrosion. Conduit stub-ups shall be terminated in couplings, slightly above the finished concrete curb.

B. Conduit Connections to Equipment.

1. At each motor, limit switch, solenoid valve, electrical control device or other electrically controlled or operated equipment, the Contractor shall install a complete conduit connection between the conduit system and the terminal box of the motor or the conduit connection point of the equipment.

2. Conduits installed in the conduit system shall be terminated in such locations as to permit direct connections to motors, devices or equipment.

3. Connections shall be made with rigid conduit if equipment is fixed and not subject to adjustment, mechanical movement or vibration. Rigid connections shall be provided with union fittings to permit removal of equipment without cutting, breaking or burning conduit.

4. Motors, transformers and equipment subject to adjustment, mechanical movement or vibration shall be connected with flexible metallic conduit.

5. Devices such as solenoid valves, small limit switches, etc., shall be connected with flexible metallic conduit arranged to prevent strain and distortion.

6. Flexible conduit connections shall be watertight unless the area of installation requires explosion-proof construction.

C. Installation of Boxes and Fittings.

1. All concealed outlet boxes shall be set in such a manner that they will be plumb and flush with the finished surface.

2. Boxes shall be installed rigidly and securely to the structure. Independent supports shall be provided where no walls or other structural surface exists.

3. Expansion and expansion/deflection fittings shall be installed where conduits cross structural expansion joints and at locations shown on the Contract Drawings. Fittings shall be installed on each conduit and incorporated into the expansion joints of structures, at right angles to the joint, to insure their proper functioning and preservation.

4. Expansion fittings shall be installed on exposed conduit runs exceeding 200 feet. Unless specifically shown otherwise on the Contract Drawings or stated in this Specification or the Specifications, when crossing structural expansion joints larger than one inch, an expansion fitting shall also be installed together with an expansion/deflection fitting. The fittings shall be installed on each conduit run in accordance with manufacture's recommendations to provide the additional movement necessary.

5. All conduit connections in wet and corrosive locations shall be made up watertight and shall terminate at enclosures with an approved conduit hubs.

6. All conduit connections in dry and dusty locations shall terminate at enclosures with bushings and lock nuts. Terminations shall include one bushing and two lock nuts at each location. Lock nuts shall be installed one inside and one lock nut outside the enclosure. All conduit shall be bonded to the safety ground.

7. At pull and junction boxes having any box dimension in excess of 18 inches, jumper type grounding bushings shall be installed on conduit ends and jumper wires shall be installed to bond all conduits and to bond conduits to boxes.

8. All insulated grounding bushings shall be bonded together and to the structure of the enclosure by a continuous, copper bonding wire.

9. Removable, flame-retardant, insulating cable supports shall be provided in all boxes with any dimension exceeding 3 feet.

10. Scratched PVC coated boxes and fittings damaged as a result of installation work shall be touched up by field applying PVC coatings. All touch up work shall be in strict conformance with manufacturer's recommendations.

D. Installation within Hazardous Areas.

1. Explosion-proof boxes and fittings shall be of a type approved by the Engineer. Boxes and fittings shall be of cast iron with finish as specified hereinbefore or of an aluminum alloy specially developed for use in hazardous areas.

2. Explosion-proof boxes shall be suitable for the installation of explosion-proof switches, receptacles, lighting fixtures or other devices as indicated. All conduit connections to such boxes shall be made with threaded fittings. Bushings and locknut connections shall not be used.

3. Conduits terminating at explosion-proof boxes, enclosing circuit opening equipment, shall be sealed at the entrance to the box with an approved compound-filled sealing fitting to prevent passage of explosive or combustible gases through the conduit. Where construction prevents the use of sealing fittings, the ends of the conduits shall be properly sealed with sealing compound.

4. Sealing fittings shall be installed to seal each conduit leading from or entering into hazardous locations. Exposed conduits passing through hazardous locations shall be sealed at point of exit and entrance.

5. The installation of explosion-proof boxes, fittings and all conduits in connection therewith shall conform to the requirements of the NEC (NFPA 70) for Class I, Division 1 Group D hazardous location.

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, the electric conduit system shall be field tested. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

1. Each conduit shall be tested by pulling through a cylindrical mandrel as specified under this Section. Maintain a record of all conduits testing clear.

2. Conduit systems shall be ground tested in the presence of the Engineer, who will inspect all enclosures, pull and junction boxes for bonding to the safety green conductor pulled with the nominal 120 volt and higher power and control circuits, and for bonding of the conduit grounding bushing to this safety ground.

3. The separation of above safety grounding system from the instrumentation signal grounding shall be verified.

4. The Contractor shall provide a Field Test Report. The Report shall identify the testing performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All conduits shall be carefully cleaned before and after installation and all inside surfaces shall be free from all imperfections likely to injure the cable. Conduits shall be cleaned in accordance with the following:

1. After erection of complete conduit runs, conduits shall be snaked with a suitable swab to which shall be attached an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit.

2. All conduits through which the mandrel will not pass shall be removed and replaced by the Contractor at its own expense.

3. After snaking, the ends of the dead-ended conduits shall be protected with standard malleable iron caps to prevent the entrance of water or other foreign matter.

4. Conduit ends shall be protected after cleaning with caps to prevent entrance of water, concrete, debris or other foreign substance.

END OF SECTION

SECTION 26 05 43 – UNDERGROUND DUCTS, MANHOLES AND RACEWAYS FOR ELECTRICAL SYSTEMS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing underground ducts, electric manholes and raceways for electrical systems.

1. This Section also includes requirements for providing electric handholes.

2. Underground ducts, electric manholes, electric handholes and raceways shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

3. Underground ducts shall be concrete encased. The Contractor shall provide reinforced concrete encasement for the duct system.

B. The Contractor shall perform all excavations, complete all forms, and do backfilling and tamping, as required, unless specifically shown otherwise on the Contract Drawings or stated in the Specifications.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	7
2.04	Source Quality Control / Shop Tests	7
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 03 21 00 - Reinforcing Steel

C. Section 05 05 23 - Miscellaneous Metal Castings

D. Section 26 05 27 - Grounding

E. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

F. Section 31 23 25 - Fill

1.04 REFERENCES

A. Definitions

1. Not Used.

B. Reference Standards

1. Underground ducts, electric manholes, handholes and raceways shall comply with the latest applicable provisions and recommendations of the following:

a.	NEMA TC2	-	Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
b.	NESC	-	National Electrical Safety Code
c.	UL 651	-	UL Standard for Safety Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
d.	UL 2420	-	UL Standard for Safety Below ground Reinforced Thermosetting Resin conduit (RTRC) and Fittings.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited, to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's technical information with name, designation and catalog number for all products for the underground ducts systems, manholes, handholes, raceways and accessories proposed for use.

3. Drawings showing interior and exterior dimensions and details of openings, jointing, inserts and reinforcing.

4. Scaled Shop Drawings showing the routing of the duct banks and the location of manholes, handholes and the principal outline of buildings and structures. Reference duct banks dimensionally from fixed objects or structures. Include profiles of duct banks showing crossings with piping and other underground systems.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Underground ducts, manhole, handholes and raceways shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's instructions.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Rigid Steel Conduit: See Section 26 05 33 - Raceway and Boxes for Electrical Systems.

B. PVC conduit shall be as manufactured by:

1. Allied Tube & Conduit, Harvey, IL.

2. Heritage Plastics, Harvey, IL.

3. Or approved equal..

C. Warning tape shall be as manufactured by:

1. Seton, Branford, CT.

2. Ideal Industries, Sycamore, IL.

3. Or approved equal.

D. Duct Seal: See Section 26 05 33 - Raceway and Boxes for Electrical Systems.

E. Reinforced Concrete: See Section 03 30 00 - Cast-in-Place Concrete and Section 03 21 00 – Reinforcing Steel.

F. Expansion and Deflection Fittings: See Section 26 05 33 - Raceway and Boxes for Electrical Systems.

G. Conduit Bushings: See Section 26 05 33 - Raceway and Boxes for Electrical Systems.

2.02 MATERIALS / EQUIPMENT

A. Rigid Steel Conduit

1. Rigid Steel conduit without a PVC coating shall be used for all ducts. Rigid Steel Conduit Rigid Steel Conduit shall be in accordance with the requirements of Section 26 05 33 - Raceway and Boxes for Electrical Systems.

B. Non-Metallic Conduit and Fittings

1. Non-metallic conduit for ducts where shown on the Contract Drawings shall be PVC plastic or fiberglass-reinforced epoxy.

a. PVC plastic conduit shall be Schedule 40, NEMA type EPC-40 rated 90 degrees C, conforming to UL No. 651.

b. Reinforced thermosetting resin conduit and fittings shall conform to UL No. 2420. Both conduit and fittings shall consist of 68 percent glass content encapsulated in an epoxy matrix.

2. All non-metallic fittings, elbows, bodies, terminations, expansions and fasteners shall be the same material and manufacturer as the conduit.

C. Underground Duct Accessories and Fittings

1. Conduit Spacers

a. Factory fabricated conduit spacers shall be nonmetallic, vertical and horizontal interlocking type to maintain spacing between conduits. Spacers shall be suitable for all types of conduit in multiple sizes.

2. Warning Ribbon

a. Warning ribbon shall be a three inch wide, four mil polyethylene or polyvinyl chloride detectable tape. The tape shall be permanently imprinted in red color, “CAUTION BURIED ELECTRIC LINE BELOW.”

3. Duct Seal

a. Duct seal for conduits shall be in accordance with the requirements of Section 26 05 33 - Raceway and Boxes for Electrical Systems.

4. Reinforced Concrete

a. Concrete for envelope shall be in accordance with the requirements of Section 03 30 00 - Cast-in-Place Concrete. Steel reinforcement shall be in accordance with the requirements of Section 05 12 00 - Structural Steel Framing.

5. Expansion and Deflection Fittings

a. Where specifically shown on the Contract Drawings, expansion and deflection fittings shall be provided at the structural joints of the underground duct system.

b. Expansion and deflection fittings shall be in accordance with Section 26 05 33 - Raceway and Boxes for Electrical Systems.

6. Conduit Bushings

a. Conduit bushings shall be provided for the termination of rigid steel conduits at each manhole.

b. Conduit bushings shall be in accordance with Section 26 05 33 - Raceway and Boxes for Electrical Systems.

D. Manholes and Handholes

1. Manholes and handholes shall be cast-in-place type of reinforced concrete. Where specifically shown on the Contract Drawings or stated in the Specifications, the use of precast type manholes and handholes shall be permitted.

2. Manholes associated with service feeders shall be in accordance with the requirements of the Utility.

3. Concrete for manholes and handholes shall be in accordance with the requirements of Section 03 30 00 - Cast-in-Place Concrete. Manholes and handholes shall be constructed to withstand ground water pressure when completely submerged by rising water table.

4. Steel reinforcement shall be as shown on the details on the Contract Drawings and shall be in accordance with the requirements of 05 12 00 - Structural Framing.

5. Manholes and handholes shall have dimensions as shown on the Contract Drawings and shall be provided with all duct entrances sized and located to suit duct banks.

6. Concrete floor shall be sloped towards the drain sump at the center of each manhole and handhole.

7. All manhole and handhole hardware shall be hot dipped galvanized steel.

E. Manhole and Handhole Accessories

1. Frames and Covers

a. Each manhole and handhole shall be provided with a cast-iron watertight manhole frame with inside and outside covers.

b. All frames and covers shall be in accordance with the requirements of Section 05 05 23 - Miscellaneous Metal Castings. Frames and covers shall be annealed, high quality, gray cast iron, free from blowholes, sandholes, scabs, fins, scales and other defects. They shall be uniform in form and dimensions, and shall be as approved by the Engineer.

c. The frames shall be so set that the completed installation will provide a proper alignment of the outside covers with the roadways or other surrounding areas. Manhole and handhole covers shall fit the frame without undue play.

d. The following words shall be cast in the top of all manhole and hand hole covers, as appropriate.

1) "ELECTRIC POWER, LOW VOLTAGE"

2) "ELECTRIC POWER, MEDIUM VOLTAGE"

3) "COMMUNICATIONS / INSTRUMENTATION"

2. Cable Supports

a. Manholes shall be furnished with cable racks, cable hooks and insulators to effectively support all cables indicated for present and future installation.

1) Cable racks shall be made from steel channel with ample strength to support cables. Racks shall be firmly anchored to walls.

2) Cable hooks shall be made from malleable iron.

3) Racks and hooks shall have hot-dipped galvanized finish.

4) Insulators shall be made of high-grade dry-process porcelain with smooth glazed surfaces and shall fit hooks in such manner as to prevent wobbling and insure minimum movement.

3. Pulling Irons

a. Galvanized steel pulling irons shall be provided for each manhole and handhole. Pulling irons shall be cast in the wall opposite to the centerline of each incoming duct bank and 12 inches below centerline of bottom line of ducts.

4. Grounding

a. Each manhole shall be provided with a grounding system. The grounding system shall consists of ground rods and cable in accordance with the details shown on the Contract Drawings.

b. Ground rods and cable shall be in accordance with the requirements of Section 26 05 27 - Grounding.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Duct Banks

1. The duct system shall be installed to avoid interferences with structures, piping and other underground systems. Conduit duct banks shall be sized, arranged and installed in a reinforced concrete envelope as shown on the Contract Drawings.

2. Trenches for duct banks shall be in accordance with the requirements of Section 31 23 15 - Excavation. Duct bank trenches shall have the bottom tamped firm and even, and suitably braced side forms shall be employed in forming the envelope.

3. Duct banks shall follow straight lines as far as possible. Where deviation from a straight line becomes necessary, offsets shall be made using 5 degree angle coupling or make bend with sweeps. The sweep radius shall be 48 inch for 90 and 45 degree bends and 36 inch for 30 degree bends. Where directed by the Engineer, bends shall be made up with standard factory bends or other approved curved sections.

4. Duct bank installations and penetrations through foundation walls shall be made watertight.

5. Duct banks shall be assembled using non-magnetic saddles, spacers and separators. Separators shall be positioned to provide 3-inch minimum concrete separation between the outer surfaces of the ducts.

6. Concrete covering shall be provided on both sides, top and bottom of the concrete envelopes around conduits. Concrete covering shall be in accordance with the detail shown on the Contract Drawings. Top of concrete encasement shall not be less than thirty inches below finish grade.

Add red dye to concrete used for envelopes or trowel a coloring on the concrete for easy identification during subsequent excavation.

7. Before pouring concrete, written approval shall be obtained from the inspecting engineer.

8. Ducts shall be firmly fixed in place during pouring of concrete. Concrete shall be carefully spaded and vibrated to insure filling of all spaces between ducts.

9. A transition shall be made from non-metallic to rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Rigid steel ducts shall be terminated using insulated grounding bushings. Ducts inside buildings shall be continued using rigid steel or PVC coated rigid steel conduits as required for the area.

10. Ducts entering manholes and hand holes shall be terminated using suitable end bells. Rigid steel ducts shall be terminated using insulated grounding bushings.

11. Backfilling for duct banks shall be in accordance with the requirements of Section 31 23 25 - Fill. Backfilling shall be permitted when directed by the engineer to proceed. Backfilling shall not be with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material or other materials which can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.

12. Duct runs shall be sloped for drainage toward manholes and away from buildings with a slope of approximately 3 inches per 100 feet.

13. A ground cable shall be installed in each duct bank envelope. Cable shall be in accordance with the requirements of Section 26 05 27 - Grounding. The ground shall be made electrically continuous throughout the entire duct bank system. Ground cable shall be connected to the building, station ground grid, equipment ground buses and to each conduit grounding bushing of the underground duct system. The ground cable shall be terminated at the last manhole or handhole for outlying structures.

14. A warning ribbon shall be installed approximately 12 inches below finished grade over all underground duct banks carrying cables of 480 volts and higher.

15. All ducts entering buildings and structures shall be sealed. All empty spare ducts shall be sealed and plugged.

16. An expansion and deflection fitting shall be installed on each conduit at each of the structural expansion joints when shown on the Contract Drawings. Joints shall be located as defined by the criteria noted on the Contract Drawings.

B. Manholes and Handholes

1. Manholes and handholes shall be installed where shown on the Contract Drawings. Place each manhole and handhole on a 12-inch crushed-stone base and make level.

2. Manhole and handhole excavation shall be in accordance with the requirements of Section 31 25 15 - Excavation. Backfilling for manholes and handholes shall be in accordance with the requirements of Section 31 23 25 - Fill.

3. Manhole and handhole installation shall be completed so that structure is watertight. All penetrations through manhole walls and bottoms to facilitate equipment such as ground rods shall be made through cast in place sleeves. Sleeves shall be made watertight after the installation of equipment. Two coats of bituminous waterproofing material shall be applied to exterior surface of each manhole and handhole. A waterproof gasket shall be provided all around removable precast manhole cap.

4. Cable racks shall be installed within each manhole for the support of cables. Cable racks shall be in accordance with the following:

    a. Attach racks with 3-inch by 3/8-inch diameter tamp-in studs mounted in 1-inch holes drilled into walls of manholes in the absence of inserts. Apply PVC coating to all racks.

    b. Provide cable hooks to support each cable on each rack along the cable run within the manholes. Apply PVC coating to all hooks.

    c. Individually support each cable at each hook on porcelain insulators. Provide sufficient slack for each cable.

    d. In the manhole securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4-inch strapping tape as manufactured by 3M or tie down with nylon straps.

5. A grounding system shall be installed for each manhole. All exposed metal, manhole frame and cover, accessories and the concrete reinforcing rods shall be bonded with No. 4 AWG minimum bare copper wire and connected to the duct bank ground in accordance with the details shown on the Contract Drawings.

6. Concrete curb shall be provided for manholes when required to adjust manhole cover to proper grade. Curb shall be constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the curb shall be such as is necessary to bring the manhole frame to the proper grade.

7. For cast in place type manholes and handholes, pulling irons shall be set and other built-in items shall be in place before placing concrete.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning and Protection

1. After installation each conduit in each duct bank shall be cleaned and cleared of obstructions and foreign matter by rodding and by the passage of cleaning brushes or cutting mandrels.

2. After cleaning, the clearance of each conduit shall be checked by passing a 12 inch long mandrel, of diameter 1/2 inch less than the nominal duct diameter, through the entire length of duct run. Ducts which do not permit passage of the mandrel shall be cleared, cut out and replaced or sealed and replaced by additional construction. The duct bank conduit cleaning shall be included in the electric conduit system field test report specified in Section 26 05 33 - Raceways and Boxes for Electrical Systems.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing labeling and identification.

1. Labeling and identification shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. Labeling and identification shall be provided for the identification of electrical equipment.

B. The work shall include providing all voltage signs, equipment nameplates, markers, tags and arc flash labels for all electrical equipment furnished under this Contract.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 14 - Medium-Voltage Cables and Accessories

B. Section 26 05 20 - Low-Voltage Wires, Cables and Accessories

C. Section 26 05 33 - Raceways and Boxes for Electrical Systems

D. Section 40 05 97 - Identification for Process Equipment

1.04 REFERENCES

A.	NEC (NFPA 70)	-	National Electrical Code
B.	NFPA 70E	-	Standard for Electrical Safety in the Workplace
C.	ANSI Z535.4	-	American National Standard for Product Safety Signs and Labels
D.	BWT Arc Flash	-	Arc Flash Personal Protective Equipment BWT Guidelines
E.	OSHA 1910 Subpart S	-	Electrical

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. All labeling and identification signs and nameplates shall be provided in accordance with the NEC (NFPA 70), NFPA 70E and OSHA 1910 Subpart S.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include but not be limited to:

1. Submit signs, nameplates and other labeling and identification devices proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The labeling and identification devices shall be delivered, stored and handled in accordance with the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Labels shall be as manufactured by:

1. Brady, Milwaukee, WI;
2. Seton Nameplate Corporation, North Branford, CT;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. High Voltage Signs

1. High voltage signs shall be provided for equipment operating over 600 volts.
2. High voltage signs shall be fiberglass reinforced polyester, rigid acrylic or aluminum plate 1/16-inch thick. Finish shall be industry standard of red, white and black graphics. Signs shall be 10 inches by 14 inches with the following exceptions:
   a. Use 7-inch by 10-inch signs where this is the largest size that can be applied.
   b. Use 14-inch by 20-inch signs where needed for adequate vision.
3. High voltage signs shall read; "DANGER - HIGH VOLTAGE KEEP OUT".
4. High voltage sign mounting screws shall be 3/16 inch diameter, round head, stainless steel, and self-tapping type.

B. Equipment Nameplates

1. Equipment nameplates shall be provided in addition to the manufacturer's nameplate, to identify the equipment number and the item's function and the equipment to which it serves.
2. Equipment nameplates shall be provided in accordance with the requirements specified under this Section and Section 40 05 97 – Identification for Process Equipment.
3. Equipment nameplates shall be laminated plastic with black letters on a white background.
4. Nameplates for equipment identification shall have 1/2-inch high letter engravings.
5. Nameplates for pilot device identification shall have 1/4-inch high letter engravings.
6. Nameplates for distribution equipment shall have the following information:
   a. Equipment name and number.

b. Voltage.

c. Phases and number of wires.

7. Pull boxes, junction boxes and control stations shall have a nameplate identifying the equipment name and number.

8. All feeders and branch circuit devices shall have nameplates identifying the served equipment name and number.

9. Where execution of the Work under this Contract requires certain feeders and branch circuit devices to be modified, the Contractor shall provide new nameplates reflecting the modifications. The nameplates shall identify the served equipment name and number.

10. All control and indicating devices shall have individual nameplates identifying device function.

11. Nameplate mounting screws shall be 3/16 inch diameter, round-head, stainless steel and self-tapping type. Adhesives shall not be used.

C. Conduit Markers and Tags

1. Conduit markers and tags shall be provided for the identification of the electric conduit system.

2. Conduit markers and tags shall be in accordance with Section 26 05 33 - Raceways and Boxes for Electrical Systems.

D. Cable and Wire Markers

1. Cable and wire markers shall be provided for the identification of the electric wire and cable.

2. Cable and wire markers shall be in accordance with Section 26 05 14 - Medium-Voltage Cables and Accessories and Section 26 05 20 - Low-Voltage Wires, Cables and Accessories.

E. Arc Flash Labels

1. Labels shall be provided in addition to the manufacturers nameplate and equipment nameplate, to identify equipment name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.

2. Labels shall be able to withstand their usage environment, the print shall not fade, and adhesive should be aggressive enough to avoid peeling.

3. Arc flash labels shall be printed on a durable polyester base over-laminated to protect the text and graphics.

4. The back of the labels shall employ an acrylic adhesive, which allows the labels to be securely and permanently affixed to a wide range of surfaces.

5. Labels shall include no field markings.

6. Labels shall be generally in accordance with ANSI Z535.4.

7. Labels shall include at a minimum the following information based on the Arc Flash Hazard Analysis performed:

   a. Nominal Voltage of the Equipment

   b. Flash Protection Boundary

   c. Personal Protective Equipment category at the working distance

   d. Arc Flash Incident Energy Value (cal/cm^2) at the working distance

   e. Limited and Restricted Boundaries

   f. Study Report Number and Issue Date

   g. Location of Study Report.

8. Contractor shall provide DEP with two extra copies of every label applied in the High Level Release Tower and Upper Gate Chamber.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Signs and Nameplates

1. All signs, nameplates and tags shall be installed neatly, properly and as recommended by the manufacturers.

2. Signs and nameplates shall be mounted with screws.

   a. Where mounting of signs or nameplates with screws is impractical, the Contractor shall alert the Engineer.

B. High Voltage Signs

1. High voltage signs shall be installed on equipment operating at over 600 volts. High voltage signs shall also be installed on sides of fences or walls which enclose outdoor equipment operating at over 600 volts.

C. Signal Wire and Cable

1. Control, signal and status wire and cable shall be identified by a unique number. The numbering system shall reflect the actual identification used in the Work and shall be documented on the point-to-point wiring diagrams.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing Power System Studies and field testing. The Contractor shall provide Power System Studies and field testing in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. The Power System Studies shall include a load flow study, a short circuit study, a protective device evaluation study and a protective device coordination study for a completely coordinated power distribution system. Power System studies shall include other studies as applicable including but not limited to motor starting and harmonic studies.

C. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	4
1.06	Quality Assurance	4
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Installation	11
3.03	Field Testing / Quality Control	12
3.04	Startup / Demonstration	13
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not used

1.04 REFERENCES

A. Definitions

1. Power System as used in this Section shall mean all of the electrical distribution network from the Utility connection to all loads. This includes all on site generating sources, all branches and all nodes.

2. Low-Voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation at less than 1000 volts and within the 600 V Class.

3. Medium-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation above 1000 volts and below 99000 volts.

4. Node as used in this Section shall mean any point in the Power System where two or more pieces of electrical equipment connect.

5. Branch as used in this Section shall mean any element of the Power System connecting any two nodes.

6. Major Node as used in this Section shall mean any node representing actual real world connection points of branches of the Power System such as busses in switchgears, MCCs or panelboards or the connection points of cables to load and equipment.

7. Dummy Node as used in this Section shall mean any fictitious node created within the modelling software to facilitate modelling of the Power System.

8. Major Branch as used in this Section shall mean any branch representing actual real world elements of the Power System such as feeders, breakers, transformers, and cables.

9. Dummy Branch as used in this Section shall mean any fictitious branches created within the modelling software to facilitate modelling of the Power System.

10. All references to the Electric Utility or Utility shall mean the Local Electric Utility having jurisdiction as defined in this Section.

11. The Electric Utility is Con Edison.

12. Harmonic Sources as used in this Section shall mean

a. All equipment drawing non-linear currents and causing the voltage and currents at the node to which they are connected and other nodes to exhibit non-linear voltage and current characteristics. Equipment includes:

1) Convertors in variable frequency drives and switch mode power supplies.

2) Semiconductor switches modulating the voltage in soft starters, light dimmers and electronic ballast.

b. Utility sources whose waveforms are distorted dues to non-linear loads at other consumers on the Utility network.

13. Point of Common Coupling (PCC) is the node where the Power System is connected to the Utility.

a. Subordinate PCCs may be also defined at the nodes within the Power System where the equivalent network of the Utility and the Power System and specific harmonic sources are connected.

b. PCCs are shown on the Contract Drawings.

B. Reference Standards

1.	IEEE 141	-	IEEE Recommended Practice for Electric Power Distribution in Industrial Plants
2.	IEEE 399	-	IEEE Recommended Practice for Industrial and Commercial Power System Analysis
3.	IEEE 519	-	IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
4.	IEEE 1015	-	IEEE Recommended Practice for Applying Low-Voltage Breakers Used in Industrial and Commercial Power Systems
5.	IEEE 3002.2	-	IEEE Recommended Practice for Conducting Load-Flow Studies and Analysis of Industrial and Commercial Power Systems
6.	IEEE 3002.3	-	IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems
7.	IEEE 3002.7	-	IEEE Recommended Practice for Conducting Motor-Starting Studies and Analysis of Industrial and Commercial Power Systems
8.	IEEE 3002.8	-	IEEE Recommended Practice for Conducting Harmonic Studies and Analysis of Industrial and Commercial Power Systems
9.	NETA ATS	-	NETA Acceptance Testing Specification

1.05 DESCRIPTION

A. Power Systems Studies shall be completed by modelling the entire low-voltage and medium-voltage equipment of the Power System in the software detailed in this Section. The studies shall encompass existing systems and the proposed systems.

B. The model shall comprise all major nodes and major branches of the Power System.

C. The model shall also comprise dummy nodes and dummy branches to attain a level of connectivity similar to the Single Line Diagram representation of the Power System.

D. The model shall completely facilitate the examination of normal operations, and alternate operations of the Power System which could result in deviations from the normal operating values at major nodes and in major branches of the Power System.

1.06 QUALITY ASSURANCE

A. Modelling:

1. The Power System studies shall be performed in accordance with the latest applicable provisions and recommendations of the Reference Standards in this Section.

2. The Contractor shall retain the services of a licensed Professional Engineer, registered in the State of New York, to perform the Power System Studies.

3. The licensed Professional Engineer shall be from an independent consulting firm or the equipment manufacturer and shall have a minimum of 5 years of experience in performing Industrial Power System Studies.

4. It shall be the responsibility of the licensed Professional Engineer to:

   a. Evaluate all devices.

   b. Evaluate all equipment.

   c. Determine all performance indices at the PCC.

   d. Establish the settings of all protection functions.

   e. Establish the settings required to secure selective coordination among protective devices.

5. Power System Studies shall be completed using the software program listed in this Section.

6. The Contractor shall coordinate with the licensed Professional Engineer performing the studies and assist the Professional Engineer in the collection of all information necessary to complete the studies specified.

7. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the NIST and NETA ATS.

8. The Contractor is responsible to coordinate with and obtain from utility company of the available minimum and maximum three phase and line to ground fault current with associated X/R ratios and voltage.

B. Field Testing:

1. The Power System shall be field tested. The field testing shall be performed in accordance with the requirements specified under this Section.

2. The Contractor shall retain the service of an independent testing firm who shall perform field testing of the Power System. The testing firm shall have experience in the inspection and testing of the system equipment and shall be a member company of NETA. Provide proof of membership, or demonstrate that the standards and experience required for membership are possessed, all to the satisfaction of the Engineer

1.07 SUBMITTALS

A. Submittals

1. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

a. Experience of the licensed Professional Engineer who will perform the Power Systems Studies

b. Version of the software to be used to conduct Power Systems Studies

c. Calculations and results of the Power System Studies shall be submitted. The submission of calculation and results shall consist of:

1) A report detailing all the findings, recommendations and settings arising from the studies. The report shall be stamped and signed by the licensed Professional Engineer.

2) The complete software files produced by the study software, and corresponding to the findings, recommendations and settings contained in the report. Two copies of the software files shall be submitted, one copy shall be write protected and the other shall not.

2. The Power System Studies shall be submitted for approval prior to receiving the final approval of the Power System equipment and/or prior to the release of equipment drawings for manufacturing.

3. Power System Studies shall be submitted for approval prior to the Engineer giving approval for drawings to be submitted for review by the Utility.

4. In the event that formal completion of the Power System Studies may cause delay in the approval of equipment or Utility drawings then a preliminary submission of the Power System Studies shall be made. The Engineer will

determine whether the preliminary submission is sufficient to allow approval of equipment and Utility drawings.

5. Work sequence for the field testing shall be submitted. The sequence shall indicate the schedule of Work, time frame and downtime for the equipment. The work sequence shall be submitted at least 60 days in advance prior to conformation of field testing dates.

6. Qualifications of proposed testing firm to perform field testing shall be submitted. Submit firm experience records at least 60 days in advance to actual testing along with five recent references with phone numbers.

B. Reports

1. Field test report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Power Systems Analysis Software shall be as manufactured by

1. Power Analytics Corporation, Raleigh NC;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Load Flow Study:

1. The load flow study shall be preliminary to all the other studies and for all proposed operating conditions of the Power System. The load flow study shall be used to

a. Preset the study parameters as applicable for each of the studies listed under this Section.

b. Confirm the layout and balance of the power flows across the major branches

c. Establish the voltage profiles at all major nodes.

d. Identify real and reactive power flows into nodes and across the branches of the Power System.

e. Determine real and reactive power losses in the Power System.

f. Identify proposed transformer tap settings.

g. Problem areas or equipment capacity inadequacies shall be promptly brought to the Engineer's attention.

B. Short Circuit Study:

1. Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each major node and through major branches and other significant locations through the system.

2. The short circuit tabulations shall include symmetrical fault currents, and X/R ratios.

3. For each fault location, the total duty on the major nodes, as well as the individual contribution from each connected branch, including motor back EMF current contributions shall be listed with its respective X/R ratio.

C. Protective Device Evaluation Study:

1. The protective device evaluation study shall be performed to determine the adequacy of circuit breakers, controllers, surge arresters, busways, switches, and fuses by tabulating and comparing the short-circuit ratings of these devices with the prospective fault currents.

2. Appropriate multiplying factors based upon system X/R ratios and protective device rating standards shall be applied.

D. Protective Device Coordination Study:

1. The protective device coordination study shall be performed to select or to check the selections of the power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and setting.

2. The device settings computed in the coordination study shall provide complete selectivity.

a. The system shall be selectively coordinated such that only the device nearest a fault will operate to remove a faulted circuit.

b. System selectively shall be based on both the magnitude and the duration of a fault current.

3. The coordination study shall include all voltage classes of equipment starting at the utility's incoming feeder protective device down to and including each of the medium and low voltage load. The phase and ground overcurrent and ground fault protection shall be included, as well as settings for all other adjustable protective devices.

4. The time-current characteristics of the installed protective devices shall be plotted on the appropriate log-log paper. Reasonable coordination intervals and separation of characteristic curves shall be maintained. The coordination plots for phase and ground protective devices shall be provided on a complete system basis. Sufficient curves shall be used to clearly indicate selective coordination achieved to the utility main breaker, power distribution feeder breakers, and the overcurrent devices at each major load center.

5. There shall be a maximum of six protective devices per plot. Each plot shall be appropriately titled. Plots shall include the following information as required for the circuits shown:

   a. Representative one-line diagram, legend and types of protective devices selected.

   b. Utility’s relays or fuse characteristics.

   c. Significant motor starting characteristics.

   d. Parameters of transformers, ANSI magnetizing inrush and withstand curves.

   e. Operating bands of low voltage circuit breaker trip curves, and fuse curves.

   f. Relay taps, time dial and instantaneous trip settings.

   g. Cable damage curves.

   h. Symmetrical and asymmetrical fault currents.

6. The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system.

E. Harmonics Study:

1. Provide a harmonics study for the Power System including Utility and alternate sources.

2. The goal of the Harmonic Study shall be:

   a. To identify and quantify all distortions in voltage and current waveforms in the Power System.

   b. To identify and quantify all resonances in the Power System.

c. To evaluate the performance of the Power System at the PCC under all conditions of normal and alternate operations, ensuring compliance with the Recommended Harmonic Limits of IEEE 519 and or IEEE 3002.8.

d. To ensure that all remedial measures required to achieve the Recommended Harmonic Limits and mitigate resonances are incorporated into the Power System.

3. Capacitor-Inductor filter traps that require tuning to the power system are not acceptable.

4. The Contractor along with manufacturer of harmonic sources shall provide for the design, furnishing and installation of the remedial measures and appurtenances required to meet the requirements of the Harmonic Study.

5. The Contractor along with the manufacturer of harmonic sources is responsible to provide an updated single line diagram with referenced data within the submittal for this study.

6. The report shall be provided for approval prior to or with the shop drawings of the harmonic sources. Submittals of harmonic sources prior to or without the study will be considered incomplete and not reviewed.

F. Motor Starting Studies

1. Provide Motor Starting Study/Studies to determine the impact of the selected motor starting method/s proposed for this Contract.

2. Motor Stating Study/Studies shall be completed in accordance with IEEE 399 and or IEEE 3002.7

3. The Motor Starting Study/Studies shall include:

a. Starting Analysis for all motors 150 Hp and above or all motors whose starting impact is significant in relation to the Power System of this Contract.

b. Starting Analysis shall also be completed for less than 150 Hp motor/s where the following are impacting performance:

1) Variations in nominal or service voltage.

2) Size and length of feeder cable.

3) Simultaneous starting of groups of less than 150 Hp motors.

c. Determination of the impact of starting at motor bus and remote busses including but not limited to:

1) Motor/s will start with acceptable voltage drop.

2) Motor/s will accelerate within acceptable start-up times.

3) Motor/s are not subjected to nuisance tripping.

4) Voltage deviations will not disrupt loads at the motor bus and remote busses inclusive of stall of running motors.

5) Accurate evaluation of motor/load torque-speed characteristics.

6) Accurate assessment of motor/s life as a function of the starting method selected and thermal damage characteristics.

7) Voltage deviations causing variable performance of solid state and electronic equipment.

8) Voltage deviations causing lighting system/s flicker

9) Confirmation of the type of controller required to start the motor/s.

10) Confirmation of motor/s feeder sizes.

d. Recommendations to alleviate starting deficiencies identified by the Study/Studies.

1) All motors and controllers identified in the Motor Starting Study/Studies requiring specific measures to mitigate disturbances at connected and remote busses shall not be submitted without the mitigation measures clearly identified in the respective submittals.

e. Evaluation of all motor starting when the Power System is connected to the Utility or alternative on site Power Sources.

4. The report shall be provided for approval prior to or with the shop drawings of the harmonic sources. Submittals of harmonic sources prior to or without the study will be considered incomplete and not reviewed.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Study Input

1. The Contractor shall be responsible to ensure that all data to complete the Power System Studies is provided and is input to the software model including but not limited to:

a. Selection of suitable base MVA, base voltage and base current.

b. Utility and on site generation, single and three phase fault current contributions including X/R ratios.

c. Motor contributions and sequence impedances including X/R ratios.

d. Sequence resistance and reactance of all major branches.

e. Transformer impedance, X/R ratios, winding connection, tap ranges and base ratings.

f. Models, test results or characterization of Harmonic Sources.

g. All other circuit parameter to permit the complete and accurate modelling of the Power System.

3.02 INSTALLATION

A. Study Report

B. The results of the Power System Studies shall be summarized in a final typewritten report. The report shall include the following Sections:

1. Executive Summary, Description, purpose, basis, written scope

2. Load Flow

a. Tabulations of load flow study results inclusive of normal, minimum and maximum branch loadings along with normal, minimum and maximum voltages at nodes.

b. Tabulations of power losses for the Power System elements and the total power loss for the Power System.

3. Short Circuit

a. Tabulations of short circuit study results including a definition of terms and guide for interpretation.

4. Protective Device Evaluation

a. Tabulations of circuit breaker, fuses, and other equipment ratings versus calculated short-circuit duties, and commentary regarding same.

5. Protective Device Coordination

a. Protective device time versus current coordination curves.

b. Tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.

c. Tabulation of appropriate tap settings for relay seal-in units.

6. Harmonic Study.

a. Tabulation of Harmonic Sources including all VFDs operating simultaneously operating over their speed range under normal and alternate operations of the Power System.

b. Branch and node voltage and current harmonic current as a percentage of the 60 Hz fundamental up to the fiftieth harmonic, inclusive of the simultaneous operation of harmonic sources to meet specific actual loadings of the Power System.

c. All calculations used to arrive at the recommendations.

d. Explanation of the methods used to perform the study.

e. Explanation of study results with specific recommendations on filters and/or other measures that will be implemented to meet the specified limits or mitigate expected resonances.

7. Diagrams

a. Single line diagram along with suitable and relevant back annotation shall be included for each alternative of the Power System studied.

b. An impedance diagram along with suitable and relevant back annotation shall be included for each alternative of the Power System studied.

8. Software Model Files

a. The contractor shall provide two copies of the software files used to provide the Power System Studies

1) One copy of the software file shall be write protected and shall be capable of all its elements being viewed in the software program stated in this Section.

2) The second copy of the software file shall not be write protected and shall be capable of all its elements being modified by the software program stated in this Section.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. The Contractor shall provide field testing of the Power System.

2. All field testing shall be performed by the testing firm, after the completion and approval of the Power System Studies.

3. The field testing shall be witnessed by the Engineer and certified by the Contractor.

4. The testing firm shall adjust, set, calibrate and test all protective devices. All protective relays and meters in the medium and low voltage equipment shall be set, adjusted, calibrated and tested in accordance with the manufacturer's recommendations, the coordination study and best industry practice.

5. Proper operation of all equipment associated with the device under test and its compartment, shall be verified, as well as complete resistance, continuity and polarity tests of power, protective and metering circuits. Any minor adjustments, repairs and/or lubrication necessary to achieve proper operation shall be considered part of this Contract.

6. All solid state trip devices shall be checked and tested for setting and operation.

7. Circuit breakers and/or contactors associated with the trip devices shall be tested for trip and close function with their protective device.

8. Testing shall be performed at each major node to which harmonic sources are connected to determine if the predicted recommendations of the Harmonic Study have been achieved.

9. Test will measure and compare the harmonic levels with respect to those detailed in the Harmonic Study.

10. All harmonic levels of voltage and current which do not meet the recommendations of the Harmonic Study shall be corrected at the Contractor's expense.

11. All tests shall be in accordance with the manufacturer's recommendations and NETA, ATS.

12. The Contractor shall provide a field testing report. The report shall be in accordance with NETA, ATS.

3.04 STARTUP / DEMONSTRATION

A. Maintenance of Operations

1. Since the field testing Work specified shall require that equipment be taken out of service, the Contractor shall perform field testing with due regard to maintenance of operations and construction staging in accordance with this Section and the Specifications.

2. All testing procedures and schedules must be scheduled in advance prior to any work beginning.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 06 11 – CABLE AND CONDUIT SCHEDULE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install wires, cables and conduit complete and operational.

B. All wiring, cable and conduit shall be furnished and installed under this Contract, unless specifically noted otherwise.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 20 – Low-Voltage Wires, Cables and Accessories

B. Section 26 05 53 – Identification for Electrical Systems

1.04 REFERENCES

A. Definitions

1. Conduit shall include all types of raceways provided under this Contract.
2. Install or Installed, as applicable to Conduit, shall mean install all Conduit, raceways, fittings, boxes and accessories required to achieve a complete and functional conduit system.
3. Install or Installed, as applicable to Conduit, shall also include cleaning and swabbing, grounding and bonding of the conduit system and the provision of drag lines in each conduit on completion of the conduit system
4. Installed or Installed, as applicable to wire and cable, shall mean the pulling in of wires or cable, testing wire or cable insulation resistance, continuity and absence from grounds as well as terminating of all conductors and testing for proper connection.

B. Reference Standards

1. NEC (NFPA 70) - National Electrical Code

1.05 DESCRIPTION

A. The Wire, Cable and Conduit Schedule, shown on the Contract Drawings, lists the following information:

1. Conduit number
2. Conduit size
3. Point of origination
4. Point of termination
5. Enclosed wire or cable size and the number and types
6. Purpose of the wire or cable contained in the conduit such as power, control, ground, etc.
7. Miscellaneous information.

B. The Conduit numbering system consists of two parts separated by a hyphen.

1. The first part is the equipment identification number.
2. The second part is the individual conduit identification number which may be presented.

C. In general, the Wire, Cable and Conduit Schedules do not indicate lighting and receptacle circuits, as well as some other wire, cable and conduit to be provided under this Contract.

D. The Contractor shall refer to Section 26 05 20 - Low Voltage Wires Cables and Accessories, Section 26 05 53 - Identification for Electrical Systems and the Contract Drawings for additional wire, cable and conduit requirements.

1.06 QUALITY ASSURANCE

A. All Conduits shall contain a separate equipment grounding conductor sized according to the NEC (NFPA 70).

1.07 SUBMITTALS

A. Cable and Conduit Schedules shall be submitted for approval.

B. Cable and Conduit Schedules shall show all the details of all wires, cables and conduit to be installed under this Contract, including at a minimum the following information on each Conduit run:

1. Conduit Number
2. Conduit Size
3. Point of origination
4. Point of termination
5. Enclosed wire or cable size and the number and types
6. Purpose of the wire or cable contained in the conduit such as power, control, ground etc.
7. Miscellaneous information.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 08 11 – GENERAL ELECTRICAL TESTING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Electrical testing shall be provided in accordance with this Section, the Specifications and the Contract Drawings.

1. The Contractor shall provide all labor, materials, tools, instruments, power and all services necessary to provide the tests specified for all electrical materials, equipment and systems provided under this Contract.

2. The Contractor shall engage the services of an Independent Testing Company (ITC) to perform specific tests as detailed in this Section and the Specifications.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Plant refers to facilities used for the processing and conveyance of water or wastewater and includes pump stations, water and wastewater processing or treatment facilities.

2. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.

3. Medium-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation at above 1000 volts and below 99000 volts.

4. All references to the Electric Utility or Utility shall mean Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

1.	NETA ATS	-	Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
2.	Infraspection Institute	-	Standard for Infrared Inspection of Electrical Systems & Rotating Equipment

1.05 DESCRIPTION

A. Upon completion of the electrical installation, the Contractor shall perform tests to demonstrate that the entire electrical system is in proper working condition and is in accordance with the Contract Drawings and the Specifications.

1. Tests shall be as outlined in this Section and those of the individual Sections.

2. Field tests shall be in addition to the factory tests on individual items previously performed at the manufacturer's plant.

3. Perform insulation integrity tests and ground resistance tests before operating tests.

4. Determine proper rotation of motors before permanent connections are made.

1.06 QUALITY ASSURANCE

A. ITCs conducting Electrical Testing shall

a. Have a minimum of 10 years conducting tests as detailed in NETA ATS

b. Be a first tier Subcontractor.

c. Be a firm independent of any Other Contractor.

d. Be a firm independent of the Engineer or the Designer.

e. Be a NETA Accredited Company deploying NETA certified personnel.

B. ITCs conducting Thermographic Testing shall

a. Have a minimum of 10 years conducting tests as detailed by the Infraspection Institute.

b. Be a first tier Subcontractor.

c. Be a firm independent of any Other Contractor.

d. Be a firm independent of the Engineer or the Designer

e. Deploy Infraspection Institute certified personnel.

C. Calibration of Equipment

1. All test instruments and test equipment shall have been calibrated within the 12 month period immediately preceding the dates when they will be used on this Contract.

2. All test instruments and test equipment shall bear the calibration marks, stamps or seals of an approved testing body or agency with reference standards directly traceable to those held by the National Institute of Standards and Technology (NIST).

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer.

B. Submittals shall include, but not be limited to, the following:

1. Organization of the Testing Companies inclusive of details of the specific personnel that will be utilized on specific tests.

2. Documentation detailing firm accreditation

3. Qualifications of testing personnel

4. Proposed testing methods and schedules, test setup and sample data sheets

5. Calibration Reports of test equipment

6. All field test reports.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Factory Tests

1. Factory and witnessed shop testing requirements shall be as detailed in the individual equipment Sections.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Schedules/Scheduling

1. Written notice of the intent to proceed with any scheduled and approved tests shall be given to the Engineer at least two (2) weeks in advance of the commencement of the testing.
2. When testing requires that certain pieces of equipment be taken out of service, all testing procedures and schedules must be submitted to the Engineer for review and approval 45 days prior to the two (2) week notice above.
3. When testing has been scheduled as above, the Plant Superintendent must be notified 48 hours prior to any Work to allow time for load switching and/or alternation of equipment.
4. All testing that requires temporary shutdown of Plant equipment must be coordinated with Plant Superintendent so as not to affect proper Plant operations.
5. At the end of each workday, all equipment shall be back in place and ready for immediate use should a plant emergency arise.
6. In addition, should an emergency condition occur during testing, at the request of either the Plant Superintendent or the Engineer or the Engineer's designated representative attending the testing, the equipment shall be placed back in service immediately and turned over to Plant.

7. In the event of accidental shutdown of Plant equipment the Contractor shall notify Plant Superintendent or the Engineer or the Engineer's designated representative immediately to allow for an orderly restart of affected equipment.

3.02 IMPLEMENTATION

A. Test Personnel/Test Equipment

1. The Contractor, and where applicable in conjunction with the ITC, shall furnish all instruments and qualified personnel for all tests.

B. Attendance at Tests

1. All tests shall be made in the presence of the Engineer or a duly authorized representative of the Engineer.

2. A manufacturer's representative in accordance with the requirements of the specific equipment Section shall be present at all equipment tests

3. When the presence of the Engineer or the Engineer's representative is waived, sworn statements, in duplicate, of the tests made and the results thereof shall be furnished to the Engineer by the Contractor.

4. A manufacturer' representative

C. Tests/Testing by Others

1. The Electrical Contractor shall make available the electrical system and personnel when required by other Contractors to test their respective equipment.

2. The Electrical Contractor shall coordinate their resources with the other Contractors.

3.03 FIELD TESTING / QUALITY CONTROL

A. Non ITC Testing

1. The Contractor shall complete all testing not required to be completed by an ITC including:

a. All low-voltage equipment testing.

b. All raceway testing not requiring the use of medium-voltage test methods.

c. All low-voltage cable testing utilizing low-voltage or extra-low voltage methods.

d. All phasing verifications utilizing low-voltage or extra-low voltage methods.

e. All continuity testing utilizing low-voltage or extra-low voltage methods

f. All ground system bonding and continuity testing utilizing low-voltage or extra-low voltage methods.

g. All low-voltage voltage and potential testing and verifications.

B. ITC Testing

1. An independent testing company comprised of NETA certified test personnel and project administrators shall be retained by the Contractor to complete the following:

a. All dielectric tests.

b. All low-voltage protective device testing and setting related to Arc Flash Studies.

c. All low-voltage and Protective Device testing and calibration.

d. All Primary and Secondary injection tests of protective device systems.

e. All ground systems testing.

2. Thermographic Testing and Imaging

a. An independent testing company comprised of Infraspeciton Institute certified test personnel and project administrators shall be retained by the Contractor to complete the following:

1) All thermographic testing of electrical equipment.

2) As required by specific Sections.

b. The level of plant loading of equipment subject to Thermographic Testing shall be as specified in the equipment Section but shall not less than 60 percent of the rated equipment load.

C. Final Field Testing

1. The Contractor shall complete the installation and testing of the electrical installation at least two (2) months prior to the startup and testing of all other Work of the Contract.

2. During the period between the completion of electrical installation and the startup and testing of all other Work, the Contractor shall make all completed and serviceable components of the electrical installation available to the other Contractors for their use in performing Preliminary and Final Field Tests.

3. Before each test commences, the Contractor shall submit a detailed test procedure and also provide manpower and scheduling for the approval of the Engineer.

4. The Contractor shall furnish detailed test procedures for any of his equipment required as part of the field tests of systems by other contractors.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing all new protective devices in existing panelboards. Protective devices shall be provided in existing panelboards shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. The following index of this Section is included for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 - Grounding

B. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems

C. Section 26 05 53 - Identification for Electrical Systems

D. Section 26 05 73 - Power System Studies

E.	Section 26 05 75	-	Shock Hazard and Arc Flash Studies
F.	Section 26 06 11	-	Cable and Conduit Schedule
G.	Section 26 43 13	-	Low-Voltage Surge Protective Devices

1.04 REFERENCES

A.	NEMA PB1	-	Panelboards
B.	NIST	-	US National Institute of Standards and Technology
C.	UL 67	-	Panelboards
D.	UL 489	-	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures

1.05 DESCRIPTION

A. Arc Flash Labels shall be provided for all panelboards in accordance with Section 26 05 75 – Shock Hazard and Arc Flash Studies.

1.06 QUALITY ASSURANCE

A. The panelboard manufacturer shall be the manufacturer of all the major components of the panelboards as specified in this Section, the Specifications and as shown on the Contract Drawings.

B. All protective devices in existing panelboards shall be new within 6 months of manufacture and complying with the requirements of this Section, the Specifications and the Contract Drawings.

C. Panelboard shall be UL listed.

D. All cable and wire terminations at the panelboard shall be done by experienced installers who have worked with similar panelboard for a period of at least 5 years, using materials and procedures recommended by the panelboard manufacturer.

E. Testing

1. Field testing shall comply with the requirements in this Section, the Specifications and the Contract Drawings.

2. All test equipment, instrument calibration and test reports shall be in accordance with the latest edition of the accuracy standard of NIST and NETA ATS.

1.07 SUBMITTALS

A. Contractor shall submit shop drawings and material specifications for approval by the Engineer.

B. Submittals shall include, but not be limited to, the following:

1. Erection drawings and procedures.

2. Single-line diagrams

3. Detailed Elementary, Schematic, Wiring and Interconnecting Diagrams.

4. Wire lists in lieu of wiring diagrams are not acceptable.
5. Complete Bill of Material.
    a. A listing of the existing panelboards with the number and size of both existing circuit breakers and new circuit breakers identified.
6. Details of special features.
7. Instruction manuals of all protective devices.
8. Nameplate schedules.
9. Recommended spare parts list with pricing.
10. List of Special Tools.
11. List of recommended lubricants.
12. Operation and Maintenance Manuals
    a. Preliminary Operation and Maintenance manuals.
    b. Finalized Operation and Maintenance manuals.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protective devices shall be delivered, stored, protected and handled in accordance with the manufacturer's instructions, this Section and the following:

1. Existing protective devices shall be inspected when received, for shipping damage, water intrusion which may have entered the equipment during transit or loose parts and a report of any damage made to the carrier within the specified time.
2. Protective devices shall be shipped and delivered in convenient packages.
3. Each package split shall be mounted on shipping skids and wrapped for protection.
4. Shipping packages shall contain accessories to permit handling by cranes.
5. Protective devices shall be stored indoors in a well-ventilated, clean, level, dry and cool location with uniform temperature to prevent condensation.
6. Protective devices shall be protected in storage with suitable covering and air circulation maintained to ensure the equipment is kept dry and free from condensation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall furnish all spare parts, special tools and supplies for the existing panelboards as recommended by the manufacturer.

B. The spare parts, special tools and supplies shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the manufacturer's part number with complete information for use and reordering.

C. Furnish in addition the following spare parts for each panelboard installation:

1. One (1) set of complete replacement power fuses for each size and type installed.
2. One (1) spare breaker for each size and type installed.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Protective devices shall be as manufactured by:
1. Schneider, Seneca, SC
2. Siemens, Washington, DC
3. ABB, Mebane, NC.
4. Eaton Corporation;
5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Existing Panelboards
1. Existing Panelboard DP-W is Schneider Type NF rated 480Y/277V, 3PH, 4W, 60Hz, 42kA AIC.
   a. Bussing Copper Tin Plated
   b. System Ampacity 150A (Main Breaker JJ 150A), Bus Ampacity 225A
   c. Existing branch breaker are Type EJB Bolt-On
2. Existing Panelboard LP-W is Schneider Type NQ rated 208Y/120V, 3PH, 4W, 60Hz, 22kA AIC.
   a. Bussing Copper Silver/Tin Plated
   b. System Ampacity 70A (Main Breaker HD 70A), Bus Ampacity 100A
   c. Existing branch breakers are Schneider Type QOB-VH
3. Ratings:
   a. Protective device and existing panelboard ampacities, voltage, number of phases and wires shall be as shown here in and on the Contract Drawings.
4. Circuit Breakers:

a. Circuit breakers shall be the molded case type conforming to UL 489.

b. Breakers shall be the heavy-duty, bolt-on type with quick-make quick-break toggle mechanism for manual as well as automatic operation.

c. Breakers shall have 100-amp frames, with 15-amp trip elements as minimum, unless otherwise shown on the Contract Drawings.

d. All 100-amp frame breakers shall be fixed thermal magnetic trip units.

e. Frame sizes above 100 amp shall have interchangeable thermal magnetic trip units or electronic trip units.

f. Where specifically shown on the Contract Drawings breakers shall be provided with electronic trip units. Electronic trip units shall provide long time, short time, instantaneous and ground fault settings and time adjustments as a minimum.

g. Where specifically shown on the Contract Drawings ground fault circuit interrupters shall be provided. Ground fault breakers shall be equipped with solid state sensing and 5 milliamp sensitivity.

5. Directories:

a. Each panel shall be provided with a new updated directory.

b. The directory shall be protected by a glass or noncombustible plastic cover.

c. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service and the number of spares.

1) This directory shall be updated as work progresses, and final, typewritten directories shall be provided at the end of the Contract.

d. Where execution of the work under this Contract requires certain circuits to be modified, the Contractor shall update or provide panelboard directories to reflect the modifications.

1) Final typewritten directories shall be provided at the end of the Contract.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified Shop Tests:

1. Mechanical operations shall be performed to insure proper functioning of operating mechanisms and interchangeability.

2. Continuity test shall be performed on power and control wires.

3. Functional operations test which shall include pick up, dropout, time delay, sequence and polarity.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Verify that required utilities are available, conduit runs etc. are in required location and ready for use.

3.02 INSTALLATION

A. All wiring shall be neat within the panelboards. Wires shall be run vertically in the wire gutter and then terminate horizontally at a breaker.

B. The Contractor shall install blanking devices within panelboard spaces, so bus bars are not exposed.

C. Install panelboard nameplates for identification of equipment.

D. Panelboard circuits shall be installed so to balance the loads on each of the panelboards.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. After installation, the protective devices shall be field tested for operation and conformance.

2. Field testing shall conform to the requirements in this Section, Section 01 75 10 – Preliminary and Final Field Tests, NETA ATS and the Manufacturer's recommendations.

3. Field tests shall be certified by the Contractor.

4. Equipment shall not be energized without the permission of the Engineer.

B. Preliminary Field Testing

1. Preliminary field test of the protective devices shall be in accordance with the recommendations of the manufacturer, NETA ATS and shall consist at a minimum of the following:

2. Visual and physical inspections shall at a minimum verify the following:

a. Verify all directories, nameplates, tags and identification marks in accordance with approved submittal and preliminary As-Builts.

b. Physical, electrical and mechanical condition shall be inspected.

c. Insulators shall be inspected for evidence of damage or contamination.

d. Breaker settings and adjustments shall be verified.

e. Breakers and vertical sections shall be checked to determine that they have been properly installed, and connected.

f. Equipment shall be cleaned as required.

3. Electrical testing shall at a minimum include:

a. Test continuity of all outgoing circuits.

b. All connections shall be inspected for high resistance.

c. Ground-resistance tests shall be performed.

d. Perform resistance measurements through bolted connections with a low-resistance measuring device.

e. Perform insulation-resistance measurements on each bus, phase-to-phase, and phase-to-ground for one minute.

f. An over potential test shall be performed on each bus, each phase-to-ground and on each switch in the closed position. Test each pole with other poles grounded.

C. Preliminary Loading Tests

1. Preliminary loading tests shall at the minimum include:

a. Primary voltage shall be applied to the complete primary bus via the panelboard main breakers.

1) Each new protective device shall be closed for one hour to energize its associated load.

a) During this one hour period all circuits shall be checked for voltage, current, voltamp, and var values, phasing, phase sequence along with any associated metering displays.

D. Infrared testing shall be performed once after initial energization of the panelboard and a second time after full load has been applied continuously for (24) hours.

E. Panel Final Field Test

1. Panel final field test shall be considered complete when all the new outgoing circuits shall have energized their various loads for the Final Field Test of the respective load.

F. Any deficiencies or issues which may arise during preliminary field tests, preliminary loading tests or panelboard final field tests shall be remedied by the Contractor at no additional cost to the City.

3.04 STARTUP / DEMONSTRATION

A. Protective Device Startup

1. Startup shall comply with the requirements of Section 01 79 05 – Startup and Training and shall be considered completed when all the new circuit loads on the panelboard completes their startup requirements.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing low-voltage fuses. Low-Voltage Fuses shall be provided in accordance with the requirements of the Contract Drawings and Specifications.

B. Fuses shall be suitable for use with power circuits.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Low-voltage as used in this Section and other Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.

B. Reference Standards: Low-voltage fuses shall comply with the latest applicable provisions and recommendations of the following even if not specifically listed in this Section:

1. UL 248 - Low-voltage Fuses.
2. NEMA FU1 - Low-Voltage Cartridge Fuses.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

1. Low-voltage fuses shall be designed, built and tested in accordance with UL 248.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Manufacturer's catalog cuts for the fuses proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.
2. Time-current curves for the fuses proposed for use.

B. Reports

1. Field Test Reports shall be submitted.
2. Manufacturer's Site visit report shall be submitted.

C. Operation and Maintenance Manual

1. Operation and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Fuses shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spares

1. The Contractor shall furnish and deliver to the Engineer, at that part of the site and at such time as the Engineer may direct, spare fuses in accordance with this Section and the Specifications.
2. The spare fuses shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the

manufacturer's part number with complete information for use and reordering.

3. Spare fuses shall include at a minimum the following:

a. 10 percent of each rating used.

b. Minimum of three of each rating.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Low-voltage fuses shall be as manufactured by:

1. Mersen Ferraz Shawmut, San Francisco, CA;

2. Littlefuse, Chicago, IL;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Fuses shall be compatible with the system operating voltage shown on the Contract Drawings.

2. Low-voltage fuse ampere ratings shall be as shown on the Contract Drawings.

B. Low-voltage Fuses:

1. Low-voltage fuses shall be current limiting, time delay type. Low-voltage fuses shall have a 200,000 RMS symmetrical ampere interrupting rating.

2. Low-voltage fuses with current ratings up to 600 ampere shall be UL class RK1.

3. Low-voltage fuses with current ratings greater than 600 ampere shall be UL class L.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Fuses shall be installed within equipment in accordance with the manufacturer's recommendations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 41 13 – LIGHTNING PROTECTION FOR STRUCTURES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing modifications and additions to the existing lightning protection of structures.

B. Lightning Protection Systems (LPS) for structures or buildings shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

C. The Contractor shall retain the services of a Certified LPS Installer.

D. The Certified LPS Installer shall furnish all labor, materials, equipment, services and incidentals necessary for the installation of a functional and complete LPS as specified herein.

E. The following index of this Section is presented for convenience:

F.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 25 05 27 - Grounding

B. Section 26 05 53 - Identification for Electrical Circuits

C. Section 26 24 16 - Panelboards

1.04 REFERENCES

A. Definitions

1. Certified LPS Installer is a Subcontractor who is UL Master Labelled Certified Lightning Protection System Installer or Lightning Protection Institute Certified Installer.
2. Certificate of Inspection, where used in this Section, shall mean UL Lightning Protection Master Label Certificate.
3. Letter of Findings, where used in this Section, shall mean an official UL report detailing inspection of a LPS with intentional noncompliance due to construction or limitations of scope outlined by the installer that render an LPS ineligible for a UL Lightning Protection Master Label Certificate.
4. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.
5. All references to the AHJ (Authority Having Jurisdiction) shall mean the NEC (NFPA 70).
6. All references to the Electric Utility or Utility shall mean Consolidated Edison Company or the Local Electric Utility having jurisdiction.
7. LPI – Lightning Protection Institute.

B. Reference Standards

1. LPI 175 - Standard for the Design-Installation-Inspection of Lightning Protection Systems.
2. NFPA 780 - Standard for the Installation of Lightning Protection Systems
3. NEC (NFPA 70) - National Electrical Code
4. UL 96 - Standard for Lightning Components.
5. UL 96A - Standard for Installation Requirements for Lightning Protection Systems.
6. UL 467 - Grounding and Bonding Equipment
7. UL 651 - Schedule 40, 80, Type EG and A Rigid PVC Conduit and Fittings.
8. UL LPS Guide - UL Marking and Application Guide – Lightning Protection.
9. ANSI/IEEE 141 - Recommended Practice for Electric Power Distribution for Industrial Plants.

10. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Installer

1. The LPS Installer shall be a Certified LPS Installer.
2. Provide proof of the certification, or demonstrate that the standards and experience required for certification are possessed, all to the satisfaction of the Engineer.

B. Materials

1. All materials shall be new and shall comply in weight, size and composition as required by UL 96A and NFPA 780 and for the structures or building to be protected.
2. Class I materials shall be used for systems on structures not exceeding 75 feet in height.
3. Class II materials shall be used for systems on structures exceeding 75 feet above grade.
4. All materials used in the installation shall be labeled or listed by UL for use in LPSs
5. All materials shall be of copper and high copper-content bronze castings or stainless steel.
6. LPS materials shall be selected to ensure that electrolytic or galvanic action does not occur at the contact points or surfaces.
7. Where dissimilar metals are in contact care must be taken to ensure that bimetallic connecting accessories are used and permit only similar metals to be in contact.

C. Certification of the Installation

1. The Engineer shall be given 96 hours notice of the intent to cover or conceal all parts of the LPS which will not be visible after completion and turn over of the installation.
2. The completed system shall be in accordance with UL 96A and NFPA 780 or LPI 175 but not both.
3. A Certificate of Inspection shall be provided for the completed LPS.
4. For installation areas, where a Certificate of Inspection is not available, a Letter of Finding shall be obtained.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer.

B. Submittals shall include, but not be limited to:

1. Qualifications of proposed Certified LPS Installer.
   a. Submit experience records at least 45 days in advance to equipment submittals.
   b. Five recent references with phone numbers shall be submitted.
2. Manufacturer's catalog cuts and technical information for the LPS materials proposed for use in this Contract.
   a. Submittals shall demonstrate the mechanism that will be used to isolate dissimilar materials.
3. Scaled Shop Drawings showing proposed routing and layout of the LPS with installation details. Drawings shall include the stamp of the Certified Installer- Designer responsible for the system design.
4. Photographic and video documentation to show how the LPSs were installed in-ground and all concealed portions of the installation.

C. Certificates of Compliance:
   1. Certificate of Inspection or Letter of Finding shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Lightning protection system materials shall be delivered, stored and handled in accordance with the manufacturer's recommendations and this Section.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The lightning protection system shall be as manufactured by:
   1. Heary Brothers Lightning Protection Company, Springville, NY.
   2. Thompson Lightning Protection Company, West St Paul, MN.
   3. East Coast Lightning Equipment, Winsted, CT.
   4. Pentair Erico, Solon, OH
   5. Harger, Grayslake, IL;
   6. Or approved equal.

B. Non-metallic conduit and fittings shall be by as manufactured by:
   1. Carlon (Thomas & Betts) - Memphis, TN.

2. Cantex Inc., Fort Worth, TX
3. Or approved equal.

C. Not Used

2.02 MATERIALS / EQUIPMENT

A. All materials used in the installation shall be new and shall comply in weight, size and composition as required by UL 96A and NFPA 780

B. All lightning protection system fittings shall be heavy duty type.

C. All bolts, screws and hardware shall be stainless steel.

D. Air Terminals and Accessories

1. Air terminals shall be not less than 18 inches long, not less than 5/8-inch in diameter and may be manufactured in separate parts if longer than 10 inches.
2. Air terminals shall include a cast bronze point protector, stainless steel adapter and copper base.
3. Air terminals shall be provided with an integral base support, or shall have not less than five full threads of engagement with a separate attachment base mounted to the structure.
4. If the air terminal has internal threads the wall thickness shall be not less than 1/16 inch at the base of the threads.
5. Air terminals longer than 24 inches shall have bracing at half its height and listed for the purpose.
6. Air terminal bases are permitted to be stamped or cast construction.
    a. Copper bases shall 0.061 minimum for copper material. If cast either copper or aluminum shall be at least 3/32 inches thick.
    b. Air terminal base support must incorporate a connector fitting for connection of the lightning conductor.
        1) The conductor contact area must be at least 1-1/2 inches on all sides of the cable.

E. Conductors

1. Class I
    a. Main conductors shall be stranded copper conductors and shall be at least 57,400 circular mils at 187 lbs per 1000 ft.
    b. Secondary or bonding conductors minimum size shall be 26,240 cir. mils for copper.
2. Class II
    a. Main conductors; shall be not less than 115,000 cir. mils for copper conductor at 375 lbs per 1000 ft.

b. Secondary or bonding conductors minimum size shall be 26,240 cir. mils for copper.

F. Grounding Electrodes

1. Ground rod electrodes shall be copper-clad steel, a minimum 5/8" diameter and 10 feet long.

2. Ground rods shall conform to the requirements of Section 26 05 27 - Grounding.

G. Ground Cables:

1. Ground cables shall be copper or aluminum where necessary to prevent dissimilar metal reaction.

2. Ground cable stranding, number and size shall be suitable for the classification of the structure to be protected.

3. All ground cable where exposed shall be corrosion resistant.

H. Non-metallic conduit shall be schedule 80 PVC plastic, 90 degrees C rated, conforming to UL No. 651.

I. Non-metallic fittings shall be of same material and manufacturer as base conduit. Cement shall be provided for joining fittings to the conduit and shall be the same manufacturer as the base conduit.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Air Terminals and Air Terminal Accessories

1. Air terminals shall extend a minimum of ten inches above the object or area they are to protect.

2. Air terminals shall be located at intervals not exceeding 20'-0" along ridges of pitched roofs and along the perimeter of flat or gently sloping roofs (flat or gently sloping roofs include roofs that have a pitch less than 3:12).

3. Flat or gently sloping roofs exceeding 50'-0" in width shall be provided with additional air terminals located at intervals not exceeding 50'.

4. Air terminals shall be located within two feet of the ends of ridges, roof edges and outside corners of protected areas.

5. Air terminals shall be installed on stacks, flues, mechanical units and other objects not located within a zone of protection.

6. Permanent metal objects on the structure having an exposed metal thickness 3/16" or greater may be substituted for air terminals and shall connected to the lightning protection system as required by the specified standards using main size conductor and bonding plates having a minimum of 3 square inches of surface contact area.

7. Air terminal bases shall be securely fastened to the structure in accordance with the specified standards.

   a. Fasteners may include stainless steel screws, bolts, nails or anchors.

   b. Adhesives shall only be used to complete other types of fasteners and shall be compatible with the fastener and structure material.

   c. Any protective sheets or pads that may be required by the roofing system manufacturer shall be furnished and installed by the Contractor.

8. Air terminal spacing exceeding these dimensions shall be permitted so long as the area protected lies within a zone of protection.

9. Air terminals shall be installed for stacks, flues, mechanical equipment, and other objects, having a metal thickness of less than 3/16 of an inch, and not located within a zone of protection.

   a. Permanent metal objects having a metal thickness 3/16 of an inch or greater shall be connected to the LPS in lieu of air terminals by main size conductors and bonding plates having a minimum of 3 square inches of surface contact area.

10. Flat or gently sloping roofs exceeding 50 feet in width, shall be protected with additional air terminals located at intervals not exceeding 50 feet in the flat or gently sloping area.

B. Conductors and Accessories

1. Conductors shall provide a two way, horizontal or downward path from each strike or air terminal to connections to the lightning protection ground electrode system.

2. Down conductors shall be sized as Class I or Class II materials in accordance with the specified standards.

   a. Down conductors where required as shown on the Contract Drawings shall be concealed in the exterior wall construction.

   b. Class II conductors from a higher portion of a structure shall continue to connections to the lightning protection ground electrode system.

   c. Down conductors shall be spaced at intervals averaging not more than 100 feet around the perimeter of the structure.

   d. In no case shall a structure have fewer than two down conductors.

e. Where down conductors are installed exposed on the exterior of a structure and are subject to physical damage or displacement, guards shall be used to protect the conductor a minimum of 6 feet above grade.

f. Metallic guards shall be bonded at each end.

3. In the case of structural steel frame construction, down conductors may be omitted and roof conductors shall be connected to the structural steel frame at intervals averaging not more than 100 feet around the perimeter of the structure.

a. Connections to the steel frame shall be made with bonding plates having an area of a minimum of 8 square inches.

4. Conductors shall be installed free of excessive splices and sharp bends.

5. Conductor bends shall form an included angle of not less than 90 degrees nor have a radius of bend of less than 8 inches.

6. Conductors shall be secured to the structure at intervals not exceeding 3 feet.

a. Fasteners shall be of the same material or of a material equally resistant to corrosion as that of the conductor.

b. Any protective sheets or pads that may be required by the roofing system shall be furnished and installed by the Contractor.

7. Connector fittings shall be listed for the purpose and of the same material as the conductor or of electrolytically compatible materials.

C. Ground Electrodes and Accessories

1. Each down conductor shall terminate at a ground electrode dedicated to the LPS, or to a building or facility ground electrode system that consists of multiple ground electrodes that are interconnected with a ground ring conductor.

2. The down conductor shall be connected to the ground electrode by as exothermically welded connection.

3. Ground rod electrodes shall be located a minimum of 2 feet below grade and shall be installed below the frost line where possible (excluding shallow topsoil conditions).

4. Where it is not possible to drive ground rod electrodes because of bedrock or shallow topsoil conditions, ground plate electrodes, radial electrodes, ground ring electrodes, concrete- encased electrodes, or combinations of these may be used in accordance with NFPA 780.

5. Where the structural steel framework is utilized as down conductors for the system, ground electrodes shall be connected to columns around the perimeter of the structure at intervals averaging not more than 60 feet apart.

a. The grounding connection at the columns shall be made using either bonding plates having 8 square inches of surface contact area or by exothermically welded connections.

D. Common Bonding of Grounded Systems

1. Common bonding of all grounded systems within the building shall be ensured by interconnecting them to the LPS using main size conductor and fittings.

2. For structures exceeding 60 feet in height, the interconnection of the LPS ground electrodes and other grounded systems shall be in the form of a ground loop conductor.

3. These grounded systems to be interconnected shall include but are not limited to the electrical service, communication, and antenna system grounds as well as all underground metallic piping systems including water, gas, sewer, underground metallic conduits, etc.

4. Interconnection to service lines or conduits shall be made on the customer's side of the meter.

5. Ground Electrodes in test wells shall be bonded to the ground system by a bronze ground rod clamp having at least 1-1/2 inches of contact between the rod and the conductor, measured parallel to the axis of the rod.

6. The system shall be installed with common grounding by interconnecting ground mediums entering the building using main size conductors and fittings. Grounded metal bodies shall be bonded to the system using bonding connections and fittings. Ground conductors where installed in conduit, shall be non - metallic type.

E. Potential Equalization

1. Grounded metal bodies located within the required bonding distance as determined by the bonding distance formula in NFPA780 shall be bonded to the LPS using the required bonding conductors and connections.

F. Roof Penetrations

1. Roof penetrations required for down conductors or for connection to structural steel framework shall be made using thru-roof assemblies with solid riser bars or conduits and appropriate roof flashing.

2. Conductors shall not pass directly through the roof.

a. The Contractor shall furnish and install the materials required to properly seal all roof penetrations of the LPS components and any additional roofing materials or preparations required by the roofing manufacturer for lightning conductor runs to assure compatibility with the warranty for the roof including roof pads that may be required to protect the roof under each of the lightning protection components.

G. Surge Protective Devices (SPD)

1. SPDs shall be provided at all power services entrances and at entrances of conductive signal and data communication devices.

2. SPDs shall comply with Section 26 43 13 – Low-Voltage Surge Protective Devices.

3.03 FIELD TESTING / QUALITY CONTROL

A. The Contractor shall have the master installer or inspector perform field inspection of the lightning protection system at several stages during the installation in accordance with LPI requirements.

B. Upon completion of the lightning protection system the Contractor shall arrange for a final inspection of the system. The final inspection shall be performed by the master installer or inspector in accordance with LPI requirements.

C. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 51 11 – LIGHTING FIXTURES, DEVICES AND SCHEDULES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing lighting fixtures (luminaires) and devices. Luminaires and devices shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. The lighting system shall be complete and include all equipment, devices and accessories as required for the installation of the luminaires and devices.

C. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	11
2.04	Source Quality Control / Shop Tests	11
PART 3	EXECUTION	11
3.01	Examination / Preparation	11
3.02	Installation	11
3.03	Field Testing / Quality Control	12
3.04	Startup / Demonstration	13
3.05	Adjusting / Protection / Cleanup	13

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 - Grounding

B. Section 26 05 29 - Hangers and Supports for Electrical Systems

C. Section 26 05 33 - Raceways and Boxes for Electrical Systems

D. Section 26 05 53 - Identification for Electrical Systems

1.04 REFERENCES

A. Reference Standards

Luminaires and devices shall comply with the latest applicable provisions and recommendations of the following even if not specifically listed in this Section:

1.	ANSI C78.377	-	Specifications for the Chromaticity of Solid State Lighting (SSL) Products
2.	DLC PR	-	DesignLights Consortium Premium Technical Requirements
3.	EISA 2007	-	Energy Independence and Security Act of 2007
4.	IES LM-79	-	Approved Method: Electrical and Photometric Measurements of Sold State Lighting Products
5.	IES LM-80	-	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
6.	IES TM-21	-	Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources
7.	NEMA SSL-1	-	Electronic Drivers for LED Devices, Arrays, or Systems.
8.	NEC (NFPA 70)	-	National Electrical Code
9.	ECCCNYS	-	Energy Conservation Construction Code of New York State
10.	UL 20	-	General Use Snap Switches.
11.	UL 924	-	Emergency Lighting and Power Equipment.
12.	UL 935	-	Fluorescent Lamp Ballasts.
13.			
14.	UL 1029	-	High Intensity Discharge Lamp Ballasts.
15.	UL 1570	-	Fluorescent Lighting Fixtures.
16.	UL 1572	-	High Intensity Discharge Lighting Fixtures.
17.	UL 1598	-	Luminaires

18. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.

19. CBM - Certified Ballast Manufacturers, CBM.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General:

1. Luminaires shall be UL listed, approved for use in the State of New York and comply with ECCCNYS.

2. The luminaire types are noted within the fixture schedule which is shown in this Section. The descriptions and catalog numbers serve to establish the quality, appearance and performance of the specified luminaires.

3. Luminaires and controls shall be as manufactured by the same manufacturer.

4. All luminaires shall be the products of lighting equipment manufacturers who have previously demonstrated, by performance and reputation, the ability to manufacture products of the quality specified and shall have a minimum of 5 years' experience manufacturing the luminaires specified. Such manufacturers must maintain an organization and manufacturing facility capable of actually manufacturing the specified luminaires. For the purpose of inspection, Contractor shall assure the Engineer, free and easy access to the manufacturing facilities and inventories of any manufacturer whose equipment the Contractor proposes to supply.

5. Luminaries over the range of operating voltage and temperature shall comply with the following:

a. Minimum power factor of 0.95

b. THD for both current and voltage of less than 10%

6. Luminaries shall have integral UL Listed Class 2 drivers and ballasts.

7. Luminaires shall have integral surge protective devices (SPD) to protect the luminaire from common mode transient peak voltages and transient peak currents.

8. Luminaires shall comply with DLC PR.

9. Luminaires utilizing incandescent sources are not permitted.

10. Luminaires shall utilize electronic or solid state drivers or ballasts where applicable.

11. The Contractor shall be responsible to assure that the exact inscription for exit and stairway signs required by local code is checked against that specified, prior to providing same. The Engineer shall be advised of any

changes required to conform to local codes before such changes are effected.

12. The Contractor shall be responsible for reviewing all Contract drawings and coordinating with all trades the installation of luminaires and devices. Luminaire and device finishes and construction shall be compatible with the approved wall and ceiling types which shall be determined by the Contractor's review of all Contract drawings.

13. All luminaires shall be of the highest quality material and construction for their respective types.

14. Lamps for all luminaires shall be in accordance with EISA 2007.

15. Luminaires shall be suitable for connection to concealed or exposed conduit runs as required in each particular location and shall be of sizes suitable for lamp sizes indicated on the Contract Drawings.

16. Fittings and other materials for special luminaires not definitely shown or specified shall be of approved material, make and quality and shall have a finish that will harmonize with other parts of the luminaires. Where suitable standard materials are not available such parts of the luminaires shall be specially manufactured.

B. Field Testing:

1. Luminaires shall be field tested. The field testing shall be performed in accordance with the requirements specified under this Section.

2. Retain the services of the emergency inverter system manufacturer for field services. Field service shall be in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's catalog cuts and drawings showing all technical information, and construction details for luminaires, including dimensions, type of wiring, weight, size, installation methods, provisions for relamping or replacing luminaires from the ground, test information criteria and rated life in hours with corresponding standard.

3. Photometric data, developed for each fixture type.

4. Lamp type and technical information.

5. Ballast type and technical information.

6. Driver type for LED luminaires and technical information including input voltage, power factor, Crest Factor and THD.

7. Scaled Shop drawings showing the locations of all fixtures and devices. The Drawings shall include the proposed routing of the branch circuits.

B. Reports

1. Field test reports shall be submitted.

2. Manufacturer's site visit report shall be submitted.

C. Operations and Maintenance Manuals

1. Operations and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Luminaires and devices shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's instructions.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall furnish and deliver to the Engineer, at that part of the site and at such time as the Engineer may direct, spare parts for luminaires and devices in accordance with this Section and the Specifications.

B. The spare parts shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the manufacturer's part number with complete information for use and reordering.

C. The following spare parts shall be furnished:

1. 10 percent lamps, lamp module or array shall be provided of each wattage of each type of lamp, lamp module or array but not less than the requirement for two luminaires.

2. Where the lamp, lamp module or array is an integral part of the luminaire and the lamp, lamp module or array is not normally replaceable provide spare luminaires instead.

3. 5 percent ballasts or drivers shall be provided of each type of type of ballast or driver, but not less than two.

4. 5 percent total fuses for each luminaire type and size but not less than one set for each size.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lamps shall be as manufactured by:

1. Cree, Durham, NC;
2. Nichia America Corporation, Wixom, WI;
3. GE Lighting, Cleveland, OH;
4. Osram Sylvania, Wilmington, MA;
5. Or approved equal.

B. Drivers and Ballasts shall be as manufactured by:
1. Osram Sylvania, Wilmington, MA;
2. Universal Lighting Technologies Inc., Nashville, TN;
3. Eldo LED, Conyers, GA;
4. Advance Transformer, Rosemont, IL;
5. Or approved equal.

C. Emergency inverter systems shall be as manufactured by:
1. Vertiv-Emerson Network Power, Houston, Texas;
2. Emergi-Lite;
3. Or approved equal.

D. General use receptacles shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

E. General use switches shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

F. Plates shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

G. Covers shall be as manufactured by:
1. Crouse-Hinds Company, Syracuse, NY;
2. Appleton Electric Company, Rosemont, IL;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Luminaires

1. A luminaire shall be provided for each luminaire symbol shown on the Contract Drawings.
2. Luminaires shall be provided with all necessary hangers, supports, conduit adaptors, reducers, hooks, brackets and other support hardware. All hardware shall have a protective, non-corrosive finish.
3. Recessed luminaires shall be provided with trim moldings and frames suitable for the types of ceilings.
4. Pendent mounted luminaires shall be suspended by means of an enclosed and gasketed cushion type hanger. The hanger shall be suitable to be mounted directly to the luminaire outlet box and shall provide a minimum of 8 degrees swing from the vertical. Stems shall be threaded rigid metal conduit, 1/2 inch minimum size. In corrosive areas stems shall be PVC coated.
5. Where luminaires are subjected to moisture, or assembled of dissimilar metals, gaskets of approved material and thickness shall be provided.
6.
7. Luminaires shall be completely wired except where they will be directly connected to branch circuit wiring. The conductors shall be not less than No. 12 gauge, stranded, with approved heat resistant covering.
8. Mounting heights of all luminaires shall be as shown on the Contract Drawings. For special types, the height shall be determined at the time of installation.

B. Lamps

1. Lamps in association with their ballasts or drivers shall have voltage ratings suitable for the voltages shown on the Contract Drawings.
2. The color temperature of lamps shall be such that the installed luminaire color temperature is as listed in this Section or shown on the Contract Drawings.
3. LED lamps shall be in accordance with the following:
    a. Comply with UL 8750
    b. CRI of not less than 85
    c. Minimum efficacy of 140 lumens/watt
    d. Lamp L80 life of not less than 100,000 hours at 25 degrees C
    e. Maximum junction temperature of 150 degrees C
    f. Binning per ANSI C78.377 at 85 degrees C

g. Very low thermal resistance to permit optimum heat transfer from the junction to the operating ambient.

4. Fluorescent lamps shall be 32 watt T8 energy efficient rapid start type for use with electronic ballast. Lamps shall be suitable for operation indoors and outdoors.

5. High pressure sodium lamps shall be clear with medium or mogul base and wattage as indicated in the luminaire schedule.

6. Metal halide lamps shall be standard-line phosphor coated with wattage as indicated in the fixture schedule.

C. Drivers and Ballasts

1. General:

a. Ballasts and Drivers shall be matched for proper operation of lamps and shall meet the requirements for luminaire light output, reliable starting and operation.

b. Ballasts and Drivers shall have dimming capabilities and the lamps shall be corresponding suitable for dimming. Dimming requirements shall be listed in this Section or as shown on the Contract Drawings.

c. Ballasts shall be UL listed and certified by approved Nationally Recognized Testing Laboratories (NRTL). Testing Laboratories and shall conform to CBM.

2. LED Drivers

a. LED drivers shall be matched to their lamps such that the luminaire supply voltage and its likely site variations shall produce a level of performance indicated in this Section and as shown on the Contract Drawings

b. LED Drivers in conjunction with the respective luminaire construction shall achieve the following:

1) Specified lumen output with variation from specified voltage of plus or minus 10%.

2) Rated life of not less than 100,000 hours.

3) THD of less than 10% across the specified voltage range and full power.

4) Power factor of not less than 95% and over the full range if dimming specified.

5) Consistent performance over the range of temperatures expected at the installation location either indoors or outdoors.

6) Cooling shall be achieved with static arrangements. Active cooling, thermal foldback or thermal sensing to achieve temperature control are not permitted.

c. Electrical connections between LED Drivers and all components of the luminaire shall be polarized and color coded to permit trouble free connection and reconnection. A connection diagram shall be imprinted on the Driver or the internal of the luminaire.

3. Emergency Inverter Systems

a. Emergency inverter systems shall be provided for operation of exit signs and emergency luminaires. Each system shall be provided with normal input and inverter output voltages, capacity and number of output circuits as shown on the Contract Drawings. The output circuits shall be any combination of up to ten security and emergency circuits.

b. Each system shall consist of an input line circuit breaker, sine wave inverter and battery section complete with the manufacturer's standard monitoring and control functions housed in a vented free standing enclosure. The enclosure shall have identifying nameplates in accordance with the requirements of Section 26 05 53 – Identification for Electrical Systems. Each system shall be UL 924 listed.

c. The inverter shall be electronic solid state type suitable for operating all type loads. The batteries shall be sealed, maintenance-free lead calcium and shall include a recharge charger and transfer relay.

d. Each system shall operate on AC single phase normal input power supplying both the security circuits and the battery charger. If the normal power is lost, the inverter shall provide, AC single phase emergency power to operate for up to 90 minutes both the security and the emergency circuits.

e. The system output shall automatically switch to battery power within 750 milliseconds upon an outage of the normal input and when restored transfer back after time delay.

4. Receptacle and Switches

a. General:

1) Receptacles and switches shall be provided in accordance with the Detailed Specification and as shown on the Contract Drawings. The receptacles and switches shall be complete and shall include all accessories for proper installation.

2) Outlet boxes for receptacles and switches shall be in accordance with Section 26 05 33 – Raceway and Boxes for Electrical Systems.

5. Receptacles:

   a. Receptacles shall be duplex grounding type, two pole, three wire, 125 volt AC, 15 ampere. Where shown on the Contract Drawings, other special receptacles with number of poles, voltage and current rating shall be provided. Matching plugs shall be provided for each special receptacle.

   b. Receptacles for indoor dry, dusty locations shall be heavy duty, straight blade type, with reinforced polyester base and impact resistant nylon face.

   c. Receptacles for wet and corrosive locations shall be marine duty, straight blade type, with heat resistant melamine body. Special receptacles in wet and corrosive locations shall be Type 316 stainless steel.

      1)

   d. Receptacles for installation in floors shall be in accordance with the following:

      1) Floor receptacles shall comprise a watertight unit consisting of a cast iron box with an adjustable top, permitting permanent angular and vertical adjustment, brass cover plate and 3/4 inch brass floor extension. The extension shall be of an approved height and shall be surmounted with a brass head arranged for a duplex receptacle. Exposed metal parts shall be finished to match adjacent metal finish.

      2) For low voltage signal and telephone work, floor outlets shall be equal to those specified above for floor installation, except that the interiors shall be designed for cable extension as approved.

   e. Fan or clock outlets shall be single receptacles with molded composition or bakelite bodies. Rating shall be 15 amperes, 125 volts. Fan outlets shall be furnished with stud supports. Clock outlets shall be of the recessed type and shall be furnished with yokes for clock support.

6. Switches:

   a. Switches shall be industrial-heavy duty, AC toggle quiet type. Switches shall be rated 120/277 volt, 20 ampere. Poles and switching shall be as shown on the Contract Drawings.

7. Plates and Covers:

   a. Stainless steel plates shall be furnished for devices in indoor dry, dusty locations. They shall have beveled edges and shall be made of Type 302/304, stainless steel.

b. Plates shall have satin finish. Attachment screws shall have matching head finish.

c. For wet and corrosive locations neoprene gasketed covers shall be used. Covers shall be galvanized ferrous or cast ferrous metal. Covers shall be PVC-coated in corrosive locations. Covers shall be equipped with gasketed spring doors for receptacles and an external operating mechanism for switches.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Luminaires

1. Luminaires shall be installed at locations shown on the Contract Drawings. Luminaire locations shall be adjusted where necessary to clear conflicts and obstructions.

2. All luminaires shall be installed complete with all hardware, and supporting devices necessary to make a safe complete and fully operative installation.

3. The Contractor shall obtain from the manufacturer for each luminaire, diagrams, illustrations and other installation instructions. The Contractor shall install in strict conformance with such instructions and the requirements of the NEC (NFPA 70).

4. Recessed fixtures shall be installed in suspended ceiling openings in conformance with manufacturer's recommendations and to suit the architectural details of the area involved. Independent supports from structural members of the building shall be provided.

5. Every fluorescent luminaire shall have at least two supports, and continuous lines of fluorescent luminaire shall be supported at 4 foot intervals.

6. Pendent mounted fixtures shall be installed with pendants 1/2 inch for stems up to 5 feet and 3/4 inch for longer lengths.

7. All pendant stem hangers shall be furnished with suitable aligner canopies or outlet box covers so that the luminaires hang vertical to the finished floor irrespective of the angle of the surface from which they are suspended. When luminaires or hanger canopies are mounted flush to the ceiling or

wall, and where raceways and outlet boxes serving the luminaires are surface mounted to the ceiling or wall, finishing rings shall be provided to conceal the outlet box. All visible hanging devices and appurtenances shall have the same finish as the luminaire.

8. Reflectors, lenses, diffusers, louvers and decorative elements of luminaires shall not be installed until completion of plastering, ceiling tile work, painting, and general clean-up in the area.

B. Emergency Inverter System:

1. Equipment shall be installed in accordance with manufacturer's instructions and recommendations.

2. Equipment shall be installed on concrete pads at locations indicated on the Contract Drawings so that sufficient access and working space is provided for ready and safe operation and maintenance.

3. Install system nameplates for identification of equipment.

C. Lighting Contactor Panels:

1. Panels shall be mounted rigidly and securely to the building structure or to supporting devices which are rigidly and securely supported to the building structure.

2. Panels shall be fastened with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units and with machine screws or welded studs on metal.

3. All panels shall be mounted parallel or perpendicular to walls, such that panels are installed in a neat and professional manner.

D. Receptacles and Switches:

1. Receptacles and switches shall be installed within outlet boxes at locations indicated on the Contract Drawings and in accordance with code requirements.

2. Receptacles shall be mounted 4 feet-6 inches above the finished floor.

3. Switches shall be mounted 4 feet 6 inches above the finished floor.

4. Where devices are grouped they shall be mounted under a common plate. Where directed or where space conditions limit gang mounting, tandem or tandem gang arrangement shall be provided.

5. Where four or more switches controlling fixtures that are not visible from the switch location are grouped, the switch plate shall be engraved and filled with colored material or otherwise suitably marked to designate the control of each switch.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests

1. After installation, the completed lighting system and receptacle devices shall be field tested for operation and conformance. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:
    a. Wiring continuity test shall be performed.
    b. Branch circuit load balance test shall be performed.
    c. Fixture and control operation test shall be performed.
    d. Emergency inverter system operation and functionality test shall be performed.
    e. Receptacle polarity and grounding.

B. Reports

1. The Contractor shall provide a field test report. The report shall identify the test performed and the results obtained.

C. Manufacturer's Field Services

1. A qualified manufacturer's service representative shall assist in the installation of the emergency inverter system, check the installation before it is placed into operation, assist in the performance of field tests, observe the initial operation and train the plant operations and maintenance staff in the care, operation and maintenance of the system.
2. The Contractor shall provide equipment start-up services and training in accordance with this Section and the Specifications.
3. The Contractor shall provide a field report from the manufacturer's representative for each visit to the site. The report shall include complete information on time, schedule, tasks performed, persons contacted, problems corrected, tests results, training instruction and all other pertinent information.
4. The service representative shall sign in with the Engineer on each day they are at the site.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning of Luminaries

1. Luminaires shall be cleaned inside and out to remove construction dust prior to the start of Field Tests and again prior to substantial completion at the direction of the Engineer.
2. Fixtures shall be relamped prior to substantial completion.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing outdoor lighting. Outdoor lighting shall be provided in accordance with the requirements under this Section, the Specifications and the Contract Drawings.

B. The outdoor lighting system shall be complete and include all luminaires, poles, pole bases, reinforced concrete foundations and accessories as required for the installation of the outdoor lighting.

C. The Contractor shall perform all excavations, complete all forms, and do backfilling and tamping as required, unless specifically shown otherwise on the Contract Drawings.

D. The following index of this Section is included for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete

B. Section 03 21 00 - Reinforcing Steel

C. Section 26 05 27 - Grounding

D. Section 26 05 29 - Hangers and Supports for Electrical Systems

E. Section 26 05 33 - Raceways and Boxes for Electrical Systems

F. Section 26 05 53 - Identification for Electrical Systems

G. Section 31 23 16 - Excavation

H. Section 31 23 23 - Fill

1.04 REFERENCES

A. Outdoor lighting shall comply with the latest applicable provisions and recommendations of the following even if not specifically listed in this Section:

1.	DLC PR	-	DesignLights Consortium Premium Technical Requirements
2.	EISA 2007	-	Energy Independence and Security Act of 2007
3.	IES LM-79	-	Approved Method: Electrical and Photometric Measurements of Sold State Lighting Products
4.	IES LM-80	-	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
5.	IES TM-21	-	Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources
6.	NEMA SSL-1	-	Electronic Drivers for LED Devices, Arrays, or Systems.
7.	NEC (NFPA 70)	-	National Electrical Code
8.	ECCCNYS	-	Energy Conservation Construction Code of New York State
9.	UL 1029	-	High Intensity Discharge Lamp Ballasts.
10.	UL 1572	-	High Intensity Discharge Lighting Fixtures.
11.	UL 1598	-	Luminaires
12.	UL 8750	-	Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General

1. Luminaires shall be UL listed and approved for use in the State of New York and comply with ECCNYS.

2. The types of luminaires are noted within the fixture schedule which is shown in this Section. The descriptions and catalog numbers serve to establish the quality, appearance and performance of the specified luminaires.

3. Luminaires shall comply with DLC PR.

4. All outdoor lighting luminaires, poles and associated equipment shall be the products of lighting equipment manufacturers and manufacturers who have previously demonstrated, by performance and reputation, the ability to manufacture products of the quality specified and shall have a minimum of 5 years' experience manufacturing the specified products. Such manufacturers must maintain an organization and manufacturing facility capable of actually manufacturing the specified luminaires, poles and associated equipment. For the purpose of inspection, Contractor shall assure the Engineer, free and easy access to the manufacturing facilities and inventories of any manufacturer whose equipment the Contractor proposes to supply.

5. Outdoor lighting system shall use low carbon alloy steel with minimum yield strength of 50,000 psi or stainless steel bolts, nuts, washers and screws.

6. Contractor shall ensure that all metals used for poles, bases, support hardware, bolts, nuts washers and screws are of similar material composition and where different, steps are taken to mitigate the effects of corrosion.

B. Field Testing

1. The outdoor lighting system shall be field tested. The field testing shall be performed in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittal shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's catalog cuts and drawings showing all technical information, and construction details for luminaires, including dimensions,

type of wiring, weight, size, installation methods and provisions for relamping luminaires from the ground.

3. Photometric data developed for each fixture including IES BUG ratings, isolux diagrams and IES lighting classification.

4. Lamp type and technical information.

5. Ballast type and technical information including power factor, input watts and ballast factor.

6. Driver type for LED and technical information including input voltage, power factor, Crest Factor and THD.

7. Pole and base construction details. For poles submit wind loading, complete dimensions and finish, include anchor bolt sizing and circle diameter.

8. Scaled Shop drawings showing the locations of all luminaires and shall include the proposed routing of supply conduits.

9. Bills of material.

B. Reports:

1. Field test reports shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Outdoor lighting equipment shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's instructions.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare Parts

1. The Contractor shall furnish and deliver to the Engineer, at that part of the site and at such time as the Engineer may direct, spare parts for the outdoor lighting in accordance with this section and the Specifications.

2. The spare parts shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the manufacturer's part number with complete information for use and reordering.

3. The following spare parts shall be furnished, with all fractions rounded up to the next number:

a. 10 percent lamps, lamp module or array shall be provided of each wattage of each type of lamp, lamp module or array but not less than the requirement for two luminaires.

b. Where the lamp, lamp module or array is an integral part of the luminaire and the lamp, lamp module or array is not normally replaceable provide spare luminaires instead.

c. 5 percent ballasts or drivers shall be provided of each type of type ballast or driver, but not less than two.

d. 10 percent fuses shall be provided of each size and type, but not less than two.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Luminaires

1. Manufactures of luminaires shall be in accordance with Section 26 51 11 – Lighting Fixtures, Devices and Schedules.

B. Breakaway In-Line Streetlight connectors shall be as manufactured by:

1. Buchanan, Hackettstown, NJ;
2. Ideal Industries, Sycamore, IL;
3. Ilsco, Cincinnati, OH;
4. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Luminaires

1. Luminaires shall be provided for each lighting fixture symbol shown on the Contract Drawings and in accordance with the lighting fixture schedule shown in this Section.
2. Heights of all outdoor luminaires shall be as shown on the Contract Drawings.

B. Poles and Bases

1. Poles and bases shall be provided in accordance with the details shown on the Contract Drawings.
2. Poles shall have a wind load rating of at least 90 mph with a gust factor of 1.3.
3. Where shown on the Contract Drawings, bases shall be provided with plug receptacles, fuses, cut-outs, switches or other devices for protection and ease of maintenance. Devices shall be in accordance with the following:
   a. Receptacles shall be housed in cast iron hot-dipped galvanized boxes and shall be watertight, heavy duty type with screwed caps.

b. Switches shall be enclosed in hot-dipped galvanized cast iron boxes. Where shown on the Contract Drawings switches shall be provided with fuses.

c. Where shown on the Contract Drawings, fused applications shall be provided with breakaway watertight, in-line fuse kits.

C. Reinforced Concrete

1. Concrete for pole foundations shall be in accordance with Section 03 30 00 - Cast-in-Place Concrete, and the concrete steel reinforcement shall be in accordance with Section 03 21 00 – Reinforcing Steel.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Luminaires shall be installed at locations indicated on the Contract Drawings. Fixture locations shall be adjusted where necessary to clear conflicts and obstructions.

B. Excavation for luminaire poles shall be in accordance with the requirements of Section 31 23 16 - Excavation.

C. Backfilling for fixture poles shall be in accordance with the requirements of Section 31 23 23 - Fill.

D. Luminaire poles shall be installed on reinforced concrete foundations as shown on the Contract Drawings. Poles shall be installed in accordance with standard procedures and as recommended by the manufacturer.

E. Poles shall be wired with strain relief provided. A green grounding conductor shall be installed with each circuit, grounding by conduit method shall not be permitted

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests

1. After installation, the completed outdoor lighting system shall be field tested for operation and conformance.

2. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

a. Wiring continuity test shall be performed.

b. Branch circuit load balance test shall be performed.

c. Fixture and photo cell operation test shall be performed.

B. Report

1. The Contractor shall provide a field test report.

2. The report shall identify the tests performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning of Outdoor Lighting

1. Luminaires shall be cleaned inside and out to remove construction dust prior to substantial completion.

2. Luminaires shall be relamped prior to substantial completion.

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes specifications for a Closed Circuit Television system (CCTV System) which shall provide video coverage as shown on Contract Drawings.

B. The Contractor shall provide all labor, materials, supervision, equipment and incidentals as shown, specified, and required to furnish, install, connect, test, startup, and place into satisfactory operation the CCTV System as described herein and as indicated on the Contract Drawings.

C. Description of Work

1. The Contractor, via the Systems Integrator, shall include all necessary labor, tools, equipment, and ancillary materials required to furnish and install a complete and operational CCTV monitoring system.

2. The Contractor shall re-configure and test the existing CCTV system to include the new CCTV system furnished and installed under the CAT-475 Contract and other areas of the Gilboa Dam as shown on the Contract Drawings.

3. The extent of CCTV System work is defined on the Contract Drawings and shall include, but not be limited to:

a. Video management system, Internet Protocol (IP) network video transmission system, Ethernet switches, Media converters, fiber optic transceivers and digital recording components.

b. CCTV cameras, enclosures, lens, mounting equipment.

c. CCTV monitors.

d. Wiring, power supplies, switches and ancillary equipment.

e. Actual quantities of all equipment required are detailed on the Contract Drawings.

f. Requirements are indicated elsewhere in these Specifications for work including, but not limited to, electrical boxes and fittings required for installation of control equipment. Conduit and wiring shall be furnished and installed by the Contractor.

g. To accommodate growth and to facilitate implementation of future technologies, system components shall be modular and expandable.

h. The system shall support high-resolution recording, remote access, and integration with existing agency-wide systems.

D. The following index of this Section is presented for convenience:

E.	Article	Title	Page
	PART 1	GENERAL	1
	1.01	Summary	1
	1.02	Payment	2
	1.03	Related Sections	2
	1.04	References	2
	1.05	Description	3
	1.06	Quality Assurance	3
	1.07	Submittals	4
	1.08	Delivery, Storage, and Handling	5
	1.09	Spare Parts, Special Tools, and Supplies	5
	1.10	Warranty	5
	PART 2	PRODUCTS	5
	2.01	Manufacturers	5
	2.02	Materials / Equipment	6
	2.03	Fabrication / Assembling / Finishes	7
	2.04	Source Quality Control / Shop Tests	7
	PART 3	EXECUTION	8
	3.01	Examination / Preparation	8
	3.02	Installation	9
	3.03	Field Testing / Quality Control	9
	3.04	Startup / Demonstration	10
	3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Division 1

B. Section 28 30 00 – Security Detection, Alarm, and Monitoring

C. Section 40 67 16 – PMCS Panels and Enclosures

D. Section 40 78 90 – PMCS Panel Mounted Instruments and Devices

1.04 REFERENCES

A. ANSI/TIA-568 – Telecommunications Cabling Standards

B. ONVIF – Open Network Video Interface Forum Standards

C. IEEE 802.3 – Ethernet Standards

D. Manufacturer specifications for Pelco systems

1.05 DESCRIPTION

A. Provide and install a complete Pelco-based Closed-Circuit Television (CCTV) system including IP cameras, Network Video Recorders (NVRs), fiber-optic and Ethernet infrastructure, software, and accessories. The system shall support high-resolution recording, remote access, and integration with existing agency-wide systems.

B. New cameras shall be networked to two existing Network Video Recorders (NVRs): one at the Gilboa Precinct and one at the Gilboa Dam (BWS). The NVRs should support a 60-day record time at a rate of 15 frames-per-second at high resolution for the cameras specified. Each recorder should have a redundant array of independent disks configuration (storage back-up) and dual power supplies.

C. The Contractor shall be responsible for procuring, installing, and configuring the cameras and configuring the existing NVRs.

D. The NVRs shall be programmed by a certified installer. It shall be the responsibility of this contractor to completely program all CCTV system equipment. This shall include but not be limited to; the network name of the NVRs (coordinate through the BPS SEU System Administrator), camera presets and default position, privacy blanking, camera recording schedules. DEP BPS must have input during programming of CCTV equipment.

E. DEP makes use of IP-KVM technology in order to remotely manage video recorders. While routine management can be done using Remote Desktop Protocol (RDP), there are troubleshooting situations where direct console management is required, such as evaluating system operation when RDP does not result in a connection or witnessing the complete system boot process.

F. The cameras will reside on the LAN with 192 IP addresses while the NVRs will reside on both the DEP LAN and WAN. Therefore the NVRs should have two (2) network interface cards.

G. The existing CCTV system must remain operational throughout the life of this Contract. If any work in this Contract requires the system to be down temporarily, Contractor must coordinate and schedule the downtime with BPS via email before performing the work. At the discretion of BPS, downtime may require the Contractor to provide a temporary Live View Technologies (LVT) mobile surveillance unit until the system is back online.

1.06 QUALITY ASSURANCE

A. The materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products.

B. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

C. All material furnished under this Contract shall be determined safe by Underwriter's Laboratories, Inc. (UL) and all material shall be labeled, certified, or listed by the testing agency. All electronic devices shall be FCC compliant.

D. Custom-made equipment or related installations which are constructed specially for this Project will not be acceptable. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

E. Manufacturer of products defined in this Section shall have:

1. Industry experience: Company must have at least five (5) years experience in manufacturing CCTV systems

2. International Organization for Standardization (ISO) 9001 Certification: Manufacturing process of Company must meet stringent standards of ISO 9001 Certification.

F. Systems Integrator:

1. System Integrator shall be a Company with a minimum of 5 (five) years system design, engineering supervision, and installation experience in the CCTV surveillance industry.

2. The System Integrator shall be a Company that is trained and certified in Pelco systems and NVR programming.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 01 33 00 – Submittal Procedures and this Section.

B. Working and As-Built Drawings: The Contractor shall submit to the Engineer for approval, working drawings to substantiate conformance with the requirements set forth on the Contract Drawings and in these Specifications. Upon completion of the work, the Contractor shall submit as-built drawings to the Engineer for approval.

C. Working drawings and as-built drawings shall include, but not be limited to:

1. Complete site layout showing locations of all system devices

2. Functional system block diagrams such as power, identifying communication protocols, wire type, and approximate distances

3. Enclosure diagrams including interconnecting wiring diagrams

4. System point to point diagrams

5. Details of connections to power sources, including power supplies and grounding as well as circuit breakers feeding any security equipment

6. Equipment mounting details, including wall mounted cabinets

7. List of special tools and spare parts for any specialized equipment

8. Sequence of operations must be clearly indicated

9. IP addresses of all network connected devices

10. Conduit schedule and routing

11. Heating and cooling calculations for rack mounted equipment

12. Any drawing indicating typical equipment installation will not be accepted

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 01 65 00 – Product Delivery Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare parts should be provided to key components that are expected to fail or have a shelf life of 5 years. Those spare parts must be transmitted and delivered to BPS-SEU with the documented manifest of model number and quantity.

B. The Contractor shall provide all of the individual manufacturer's recommended spare parts and tools for all equipment specified herein. The Contractor shall include the manufacturer's recommended spare parts list with the initial submittal. Submittals without this information are considered incomplete and will be rejected.

1.10 WARRANTY

A. All manufacturers' warranty information, including service and parts contact phone numbers, should be listed by manufacturer.

B. A one-year parts and labor warranty should be provided for all installed components.

C. A warranty schedule must be provided stating warranty duration from both the contractor and manufacturer.

D. Warranties commence when the system is fully accepted; not at the time of equipment purchase or installation.

E. During the warranty period, all repair issues must be reported to BPS-SEU using the provided security deficiency report so that all types and frequency of repairs can be tracked. A report of the root cause of a problem, diagnostic steps and final resolution must be provided upon completion of any warranty related repairs.

F. Prior to the expiration of the system warranty, a follow-up site walkthrough will be performed by BPS-SEU to verify that the installed components are fully operational. Defects that are identified will be transmitted to the Contractor who must repair the system back to its fully functional state.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. IP Fixed Multi Camera System

1. Pelco

B. IP Pan-Tilt-Zoom Cameras

1. Pelco

C. Camera Power Supplies

1. Pelco

D. Camera Pole Mounts

1. AXIS T91D62 Telescopic Parapet Mount
2. Or approved equal

E. Web-Enabled Programmable Controller

1. ControlByWeb

2.02 MATERIALS / EQUIPMENT

A. IP Fixed Multi Camera System

1. Manufacturer: Pelco
2. Model: Sarix Multi Enhanced
3. Resolution: High-resolution (minimum 8MP)
4. Mounting: 6-foot lockable swing arm mast/pole. Poles shall be concrete-type on raised footings (2 feet above grade), labeled in numbered sequence with non-removable placards.
5. Features: Day/night viewing, IR illumination, motion detection, weatherproof (IP66 or better)
6. Power: PoE or 24 VAC
7. An analysis should be conducted by the Contractor to select optimal camera types and the operation of cameras. This shall include but not be limited to the following:
   a. Area lighting and the sensitivity of cameras for proper viewing
   b. Field of view to provide continuous and overlapping surveillance areas for cameras adjacent to each other to avoid blind spots
   c. Data usage examination and means to decrease data storage during times of inactivity in specific areas
   d. Camera Schedule:

Tag #	Location	Lighting	Camera	Mounting	Remarks
S5A	Northeast corner of parapet wall above Upper Gate Chamber	IR-illuminators	Pelco Multi-camera system (4 lens unit)	6-foot lockable swing arm mast	360° field of view
S5B	Southeast corner of parapet wall above High Level Release Tower	IR-illuminators	Pelco Multi-camera system (4 lens unit)	6-foot lockable swing arm mast	360° field of view

B. Pan-Tilt-Zoom Camera

1. Not used

C. Camera Power Supply

1. Power supplies shall be compatible with all equipment furnished.
2. Input voltage: 120 VAC
3. Output voltage: 24 VAC
4. Each camera shall be individually fused and isolated.
5. Power supplies shall be mounted in steel enclosures with tamper switch.
6. Manufacturer/Model No.: Pelco WCS1-4 or approved equal.

D. Web-Enabled Programmable Controller

1. Provide a web-enabled programmable controller with programmable dry contact outputs in the CCTV panel. Outputs will be used to remotely power cycle cameras on demand.
2. Network port: 10/100 Base-T Ethernet port with static or DHCP IP address configuration
3. Protocols: HTTP, HTTPS, SSL, XML, MQTT, Modbus TCP/IP, SNMP, SMTP, Remote Services
4. Modular system, expandable with I/O modules
5. Controller Manufacturer/Model No.: ControlByWeb X-400
6. I/O Module Manufacturer/Model No.: ControlByWeb X-11s Relay Module

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not used.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. All components and assemblies furnished under this Section that are part of the control unit shall be tested at the factory prior to shipment. The Testing shall include the software and hardware furnished under this Contract.
2. Before being delivered to the Gilboa Dam or being used in testing of other components, each unit furnished under this Section shall be given one hundred (100) hours Burn-in at normal operating conditions or equivalency with the unit configured as it shall be installed. Contractor shall submit factory certificate stating that this burn-in was completed at the factory prior to scheduling a witnessed test. Submit photos of burn in procedure.

3. The Contractor shall include in his bid the cost for travel and living expenses at the factory for two (2) representatives (City and Engineer) to witness the testing of the system at the factory.

4. The Contractor shall submit a test report at completion of the factory test. The equipment shall be released for shipment after receipt and approval of report by the Engineer.

B. Regulatory Requirements

1. NEC Compliance: All electrical wiring work shall comply with NEC.

2. NEMA Compliance: Electrical equipment shall comply with applicable portions of NEMA.

3. FCC Emissions: All assemblies shall be in compliance with FCC emission standards.

4. All power supplies shall be in compliance with Underwriter's Laboratories standard 1012 for power supplies.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. When excavations are necessary, security provisions must be installed if at any point the existing infrastructure is exposed, chiefly the removal of roof slabs, floor slabs, and any excavation. In addition, cameras to monitor the exposure during construction must be installed and access be provided for the DEP Police to monitor. Live View Technologies (LVT) mobile surveillance units – which are self-contained CCTV trailer units that include solar panels, powerful lighting, speakers, and mobile security cameras – must be provided for site security during construction when existing infrastructure is exposed. Measures to protect this exposure must prevent the existing infrastructure from being vulnerable to the following:

1. Unauthorized vehicle and pedestrian access

2. Construction accidents

B. Any new infrastructure in place that provides diversion of water flow downstream during construction must also adhere to the aforementioned requirement. These provisions must be designed to accommodate each phase of construction as well as post-construction but should always provide the same level of protection no matter what site conditions exist. Special attention must be given once the roof slabs are removed, and infrastructure is exposed overhead.

C. All keys to equipment must be stored away in a secure lockbox when vehicle or construction equipment (crane) overnight or is not in use. Any equipment removal/delivery will require a section of the barrier and fencing to be removed and replaced.

3.02 INSTALLATION

A. Install each item in accordance with the manufacturer's recommendations and as indicated in the Contract Documents.

B. The Contractor shall provide rigid structural support for the panels into which these units are to be mounted for the unit and shall allow all necessary access and working space to permit maintenance of the units while installed. Additional strengthening and/or bracing required for a sound installation shall be provided as part of the Contract. The Contractor shall provide all supports, bracing, wiring, and incidental hardware required for a complete and sound installation.

C. The Contractor shall provide adequate cooling and ventilation for equipment enclosures for operation at full load for continuous duty per the manufacturer's recommendations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Performance Verification Testing

1. Once installed and completely configured, and all associated equipment powered on and in working order, the Contractor must perform a PVT to verify that all equipment and programmed software are operating properly as a fully integrated system, and that the intended monitoring and control functions are entirely implemented and operational.

2. The Contractor must modify the attached PVT test log templates to include the site-specific equipment that are installed and submit the test logs for all security components to BPS-SEU for review and acceptance prior to any testing.

3. Upon acceptance of the test logs, the Contractor must perform a system test proving the equipment operates as specified in the contract requirements and provide the completed aforementioned logs stating equipment passed testing.

4. When the completed logs are submitted to BPS-SEU, a subsequent PVT demonstrating equipment operation will be performed by the Contractor with BPS-SEU witnessing the tests.

5. BPS-SEU will submit test findings and any defects or problems found during the test will be corrected by the Contractor and then re-tested to demonstrate proper operation.

B. Endurance Testing

1. A 60-day endurance test period will commence after the system is accepted. Any issues considered by DEP-SEU to be critical to the operability and maintainability of the system that are detected during the 60-day test period must be corrected promptly (within a week) by the Contractor.

2. A new 60-day endurance test period will begin following any corrective actions taken by the Contractor.

3. During the endurance test, all punch list items must be addressed and fixed. Once punch list items are corrected, a subsequent walkthrough must be provided to demonstrate items were corrected.

4. Any sequence of operation changes needed due to issues found during testing must be provided.

3.04 STARTUP / DEMONSTRATION

A. Training

1. Operator and maintenance training is required and the Contractor is expected to provide two training sessions to cover the various work shifts.

2. Each session is required to provide an operational training followed by a more in depth maintenance and repair training.

3. A syllabus of the training sessions must be provided for review and approval.

4. Operation maintenance manuals must be provided at these trainings for reference.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Key Turnover

1. All security enclosures/cabinets must be locked using hasp and padlock. BPS-SEU will provide lock manufacturer and key for replication. If enclosures are prefabricated with tumbler, locks and keys must be transmitted to BPS-SEU.

2. At least three (3) copies of each key must be provided.

3. All keys must be transmitted to BPS-SEU by following the proper chain of custody. Turn over locks and keys must not be Contractor lock and keys.

B. Additional Closeout Deliverables

1. Prior to the finalizing and submission of the Operations and Maintenance Manuals (O&Ms) and as-builts, all documents must be submitted for review and markup by BPS-SEU. Comments provided by BPS-SEU must be incorporated for issuance in final documents. These final documents must be provided in electronic formats as follows: O&Ms must be in PDF, Network Diagrams must be in Visio (to comply with DEP-IT Department's standards) and as-built drawings must be in AutoCAD and PDF.

2. O&M operator manuals, maintenance procedures, proper shut down sequences, maintenance checklists, manufacturers' cut sheets or specification sheets based on specific equipment that was installed must be provided; not generic material unrelated to the installation. Typical equipment order sheets with model numbers, serial numbers, manufacturers name and all accessories and additional features must be included within the manuals. Additionally, manuals for programming and

operating the systems, panels, and related components must also be provided.

3. Lock-out/Tag-out (LOTO) procedures for all energized, pressurized and potential energy systems must be provided showing sequential steps and specific lock out controls. LOTO must comply with DEP EH&S LOTO policy and must be reviewed and approved by DEP EH&S representative.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 28 30 00 – SECURITY DETECTION, ALARM, AND MONITORING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Section includes specifications for an integrated intrusion alarm system, which shall perform the following general services:

1. Identify intrusion
2. Activate the system
3. Notification of alarm
4. Monitoring alarm

B. The Contractor shall provide all labor, materials, supervision, equipment and incidentals as shown, specified, and required to furnish, install, connect, test, startup, and place into satisfactory operation the Intrusion Alarm System as described herein and as indicated on the Contract Drawings.

a. The system shall support high-resolution recording, remote access, and integration with existing agency-wide systems.

C. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	9

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Division 1

B. Section 28 20 00 – Video Surveillance

C. Section 40 67 16 – PMCS Panels and Enclosures

D. Section 40 78 90 – PMCS Panel Mounted Instruments and Devices

1.04 REFERENCES

A. The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction, in addition to specific details in this Specification and the Contract Drawings:

1. UL – Underwriter's Laboratories, Inc.
2. NEMA – National Electrical Manufacturers Association
3. OSHA – Occupational Safety and Health Administration
4. ANSI – American National Standards Institute
5. NFPA – National Fire Protection Association
6. JIC – Joint Industrial Council
7. IEEE – Institute of Electrical and Electronics Engineers
8. NEC – National Electric Code
9. FM – Factory Mutual
10. FCC – Federal Communications Commission

1.05 DESCRIPTION

A. The existing Intrusion Alarm System (System) consists of a network panel located in the Upper Gate Chamber, keypads, magnetic door contacts, acoustic glassbreak sensors, request-to-exit sensors, notification sirens and speakers, an autodialer, and all related power supplies, wiring and accessories. The system is armed only when the building is meant to be unoccupied.

B. Provide and install intrusion detection sensors with supervision end-of-the-line resistors on roof hatches where indicated on the Contract Drawings. Intrusion detection sensors shall be integrated with an existing Lenel-based Electronic Security System (ESS) and connected to the existing security panel located in the Upper Gate Chamber. It is anticipated that the existing security panel will have

enough spare inputs to accommodate all new input devices; however, Contractor shall provide an additional input board in panel if not.

C. The Contractor must confirm that the proposed design for this project is achievable and verifies all Lenel and associated equipment necessary for design implementation.

D. The Contractor must furnish, install and program a system that is uniform, compatible and integrated with the NYCDEP's existing Lenel OnGuard security system.

E. The Contractor must perform on-site and off-site (NYC DEP Police Communication Center) installations, programming, adjustments and data-entry to the ESS including associated computer equipment, communication transmission equipment, data transmission media, local processors, intrusion detection sensors, access control devices, and support equipment that will be monitored at the Communication Center.

F. The Contractor must coordinate with BPS SEU System Administrator to ensure that all programming complies with existing standards.

G. The existing security system must remain operational throughout the life of this Contract. If any work in this contract requires the system to be down temporarily, Contractor must coordinate and schedule the downtime with BPS via email before performing the work. Downtime outside of normal working hours will not be permitted.

1.06 QUALITY ASSURANCE

A. The materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products.

B. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

C. All material furnished under this Contract shall be determined safe by Underwriter's Laboratories, Inc. (UL) and all material shall be labeled, certified, or listed by the testing agency. All electronic devices shall be FCC compliant.

D. Custom-made equipment or related installations which are constructed specially for this Project will not be acceptable. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

E. Manufacturer of products defined in this Section shall have:

1. Industry experience: Company must have at least five (5) years experience in manufacturing and serving access management systems.

F. Installing Contractor:

1. The Contractor installing the Electronic Security System (ESS) must be a Lenel certified installer and integrator Lenel Value-Added Reseller (VAR).
2. The Contractor must provide documentation to prove experience in supplying, installing and integrating access control and intrusion detection systems.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 01 33 00 – Submittal Procedures and this Section.

B. Working and As-Built Drawings: The Contractor shall submit to the Engineer for approval, working drawings to substantiate conformance with the requirements set forth on the Contract Drawings and in these Specifications. Upon completion of the work, the Contractor shall submit as-built drawings to the Engineer for approval.

C. Working drawings and as-built drawings shall include, but not be limited to:

1. Complete site layout showing locations of all system devices
2. Functional system block diagrams such as power, identifying communication protocols, wire type, and approximate distances
3. Enclosure diagrams including interconnecting wiring diagrams
4. System point to point diagrams
5. Details of connections to power sources, including power supplies and grounding as well as circuit breakers feeding any security equipment
6. Equipment mounting details, including wall mounted cabinets
7. List of special tools and spare parts for any specialized equipment
8. Sequence of operations must be clearly indicated
9. IP addresses of all network connected devices
10. Conduit schedule and routing
11. Heating and cooling calculations for rack mounted equipment
12. Any drawing indicating typical equipment installation will not be accepted

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 01 65 00 – Product Delivery Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare parts should be provided to key components that are expected to fail or have a shelf life of 5 years. Those spare parts must be transmitted and delivered to BPS-SEU with the documented manifest of model number and quantity.

B. The Contractor shall provide all of the individual manufacturer's recommended spare parts and tools for all equipment specified herein. The Contractor shall include the manufacturer's recommended spare parts list with the initial submittal. Submittals without this information are considered incomplete and will be rejected.

1.10 WARRANTY

A. All manufacturers' warranty information, including service and parts contact phone numbers, should be listed by manufacturer.

B. A one-year parts and labor warranty should be provided for all installed components.

C. A warranty schedule must be provided stating warranty duration from both the Contractor and manufacturer.

D. Warranties commence when the system is fully accepted; not at the time of equipment purchase or installation.

E. During the warranty period, all repair issues must be reported to BPS-SEU using the provided security deficiency report so that all types and frequency of repairs can be tracked. A report of the root cause of a problem, diagnostic steps and final resolution must be provided upon completion of any warranty related repairs.

F. Prior to the expiration of the system warranty, a follow-up site walkthrough will be performed by BPS-SEU to verify that the installed components are fully operational. Defects that are identified will be transmitted to the Contractor who must repair the system back to its fully functional state.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Door Contacts

1. GE Security 1078/1076 Series
2. Resideo Model 960
3. Or approved equal

2.02 MATERIALS / EQUIPMENT

A. Steel Door Contacts

1. Type: Magnetic Reed Switch
2. Description: The contact contains a hermetically sealed magnetic reed switch. The reed shall be potted in the contact housing with a polyurethane based compound. Contact and magnet housing shall snap-lock into a 3/4" or 1" dia. hole. Housings shall be molded of flame retardant ABS plastic. Color of housings shall be off-white, grey or

mahogany brown. The magnet shall be made of Alnico V. Rare Earth Magnet shall be made of neodymium iron boron.

3. General: The steel door contacts shall monitor the designated doors and roof hatches for intrusion.
4. Housing: Aluminum, sealed, water and weather-resistant, tamper-proof
5. Operating Temperature: -4 to 140°F
6. Humidity: 10-90% non-condensing
7. Regulatory: Designed to meet the UL Transient Test
8. Mounting: Surface Mount
9. Transient voltage: Contacts shall withstand transient voltages up to 2400 VDC.
10. Wiring: 3 ft armored cable

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not used.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. All components and assemblies furnished under this Section that are part of the control unit shall be tested at the factory prior to shipment. The Testing shall include the software and hardware furnished under this Contract.
2. Before being delivered to the Gilboa Dam or being used in testing of other components, each unit furnished under this Section shall be given one hundred (100) hours Burn-in at normal operating conditions or equivalency with the unit configured as it shall be installed. Contractor shall submit factory certificate stating that this burn-in was completed at the factory prior to scheduling a witnessed test. Submit photos of burn in procedure.
3. The Contractor shall include in their bid allowable costs for travel and living expenses at the factory for two (2) representatives (City and Engineer) to witness the testing of the system at the factory.
4. The Contractor shall submit a test report at completion of the factory test. The equipment shall be released for shipment after receipt and approval of report by the Engineer.

B. Regulatory Requirements

1. NEC Compliance: All electrical wiring work shall comply with NEC.
2. NEMA Compliance: Electrical equipment shall comply with applicable portions of NEMA.

3. FCC Emissions: All assemblies shall be in compliance with FCC emission standards.

4. All power supplies shall be in compliance with Underwriter's Laboratories standard 1012 for power supplies.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. When excavations are necessary, security provisions must be installed if at any point the existing infrastructure is exposed, chiefly the removal of roof slabs, floor slabs, and any excavation. In addition, cameras to monitor the exposure during construction must be installed and access be provided for the DEP Police to monitor. Measures to protect this exposure must prevent the existing infrastructure from being vulnerable to the following:

1. Unauthorized vehicle and pedestrian access

2. Construction accidents

B. Any new infrastructure in place that provides diversion of water flow downstream during construction must also adhere to the aforementioned requirement. These provisions must be designed to accommodate each phase of construction as well as post-construction but should always provide the same level of protection no matter what site conditions exist. Special attention must be given once the roof slabs are removed, and infrastructure is exposed overhead.

C. All keys to equipment must be stored away in a secure lockbox when vehicle or construction equipment (crane) overnight or is not in use. Any equipment removal/delivery will require a section of the barrier and fencing to be removed and replaced.

3.02 INSTALLATION

A. Install each item in accordance with the manufacturer's recommendations and as indicated in the Contract Documents.

B. The Contractor shall provide rigid structural support for the panels into which these units are to be mounted for the unit and shall allow all necessary access and working space to permit maintenance of the units while installed. Additional strengthening and/or bracing required for a sound installation shall be provided as part of the Contract. The Contractor shall provide all supports, bracing, wiring, and incidental hardware required for a complete and sound installation.

C. The Contractor shall provide adequate cooling and ventilation for equipment enclosures for operation at full load for continuous duty per the manufacturer's recommendations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Performance Verification Testing

1. Once installed and completely configured, and all associated equipment powered on and in working order, the Contractor must perform a PVT to

verify that all equipment and programmed software are operating properly as a fully integrated system, and that the intended monitoring and control functions are entirely implemented and operational.

2. The Contractor must modify the attached PVT test log templates to include the site-specific equipment that are installed and submit the test logs for all security components to BPS-SEU for review and acceptance prior to any testing.

3. Upon acceptance of the test logs, the Contractor must perform a system test proving the equipment operates as specified in the contract requirements and provide the completed aforementioned logs stating equipment passed testing.

4. When the completed logs are submitted to BPS-SEU, a subsequent PVT demonstrating equipment operation will be performed by the Contractor with BPS-SEU witnessing the tests.

5. BPS-SEU will submit test findings and any defects or problems found during the test will be corrected by the Contractor and then re-tested to demonstrate proper operation.

B. Endurance Testing

1. A 60-day endurance test period will commence after the system is accepted. Any issues considered by DEP-SEU to be critical to the operability and maintainability of the system that are detected during the 60-day test period must be corrected promptly (within a week) by the Contractor.

2. A new 60-day endurance test period will begin following any corrective actions taken by the Contractor.

3. During the endurance test, all punch list items must be addressed and fixed. Once punch list items are corrected, a subsequent walkthrough must be provided to demonstrate items were corrected.

4. Any sequence of operation changes needed due to issues found during testing must be provided.

3.04 STARTUP / DEMONSTRATION

A. Training

1. Operator and maintenance training is required and the Contractor is expected to provide two training sessions to cover the various work shifts.

2. Each session is required to provide an operational training followed by a more in depth maintenance and repair training.

3. A syllabus of the training sessions must be provided for review and approval.

4. Operation maintenance manuals must be provided at these trainings for reference.

B. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Key Turnover

1. All security enclosures/cabinets must be locked using hasp and padlock. BPS-SEU will provide lock manufacturer and key for replication. If enclosures are prefabricated with tumbler, locks and keys must be transmitted to BPS-SEU.

2. At least three (3) copies of each key must be provided.

3. All keys must be transmitted to BPS-SEU by following the proper chain of custody. Turn over locks and keys must not be Contractor lock and keys.

B. Additional Closeout Deliverables

1. Prior to the finalizing and submission of the Operations and Maintenance Manuals (O&Ms) and as-builts, all documents must be submitted for review and markup by BPS-SEU. Comments provided by BPS-SEU must be incorporated for issuance in final documents. These final documents must be provided in electronic formats as follows: O&Ms must be in PDF, Network Diagrams must be in Visio (to comply with DEP-IT Department's standards) and as-built drawings must be in AutoCAD and PDF.

2. O&M operator manuals, maintenance procedures, proper shut down sequences, maintenance checklists, manufacturers' cut sheets or specification sheets based on specific equipment that was installed must be provided; not generic material unrelated to the installation. Typical equipment order sheets with model numbers, serial numbers, manufacturers name and all accessories and additional features must be included within the manuals. Additionally, manuals for programming and operating the systems, panels, and related components must also be provided.

3. Lock-out/Tag-out (LOTO) procedures for all energized, pressurized and potential energy systems must be provided showing sequential steps and specific lock out controls. LOTO must comply with DEP EH&S LOTO policy and must be reviewed and approved by DEP EH&S representative.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 31 23 23 - FILL
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Fill Work includes furnishing, placing and compacting all fill material necessary to bring excavations and site work to final grade as shown, specified or required.

B. Clean fill material from an off-site source shall be non-hazardous and shall meet the requirements of this Section.

C. This specification is based on Section 620 of the New York State Department of Transportation (NYSDOT) Standard Specifications.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	4
1.06	Quality Assurance	4
1.07	Submittals	6
1.08	Delivery, Storage, and Handling	7
1.09	Spare Parts, Special Tools, and Supplies	7
1.10	Warranty	7
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	10
2.04	Source Quality Control / Shop Tests	10
PART 3	EXECUTION	10
3.01	Examination / Preparation	10
3.02	Implementation	11
3.03	Field Testing / Quality Control	17
3.04	Startup / Demonstration	17
3.05	Adjusting / Protection / Cleanup	17

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 74 20 – Construction Waste Management

B. Section 02 24 20 – Soil Sampling and Analysis

C. Section 02 68 00 – Work on Reservoir and Diversion of Water

D. Section 03 30 00 – Cast-in-Place Concrete

E. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

F. Section 32 90 00 – Planting

1.04 REFERENCES

A. Definitions

1. Case-Specific Beneficial Use Determination (BUD): Under 6 NYCRR Part 360, Section 360.12(d), NYSDEC sets forth the requirements for petitioning NYSDEC to obtain a Case-Specific BUD, and the criteria for reviewing, granting, or denying of the BUD. For reuse of a solid waste to be determined a beneficial use, the petition must satisfy all criteria outlined under 6 NYCRR Part 360, Section 360.12(d).

2. Fill: Soil and similar material excavated or brought to the project site for the purposes of construction. All fill material must meet the requirements of this Section. It does not include overburden generated from mining operations.

3. New York City Metropolitan Area Waste Impact Zone: The area encompassing the City of New York and the counties of Nassau, Suffolk, Putnam and Westchester, as per 6 NYCRR Part 360.2 Definitions.

4. Pre-Determined Beneficial Use for fill material: Under 6 NYCRR Part 360, Section 360.13(b) Waste cessation. “Excavated material ceases to be solid waste in accordance with the following:

a. Fill Type 1 generated outside of the New York City Metropolitan Area Waste Impact Zone (NYCMAWIZ) – once a determination has been made that the material is Fill Type 1;

b. Fill Type 1 generated within Nassau, Suffolk, Westchester and Putnam Counties – once the material is delivered to the site of reuse;

c. Fill Type 1 cannot be generated within the City of New York;

d. Fill Type 2 and Fill Type 3 generated outside of the NYCMAWIZ – once a determination has been made that the material is Fill Type 2 or Fill Type 3;

e. Fill Type 2 and Fill Type 3 generated within the NYCMAWIZ – once the material is delivered to the site of reuse;

f. Fill Type 4 and Fill Type 5 – Once the material is delivered to the site of reuse.”

g. Under 6 NYCRR Part 360, Section 360.12(c)(1)(iv)(a), Excavated material used to backfill the same excavation or as grade adjustment in areas of similar physical characteristics on the site of generation.

If the material exhibits visual or historical evidence of contamination (including odors) and will be used in an area with public access, the material must be covered with pavement, foundation, or with a minimum of 12 inches of soil or fill that meets the criteria to be used as Fill Type 1 and Fill Type 2 as defined in Subdivision 360.13, Special requirements for pre-determined beneficial use of excavated material. Refer to Section 02 24 20 - Soil Sampling and Analysis for sampling requirements, including a list of parameters to be analyzed for soils to be reused on-site, or soils to be reused or disposed off-site.

5. Suitable Material: Any material whose composition is satisfactory for use as fill. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man-made (i.e. recycled) origin, including mixtures thereof, are considered suitable materials. Determinations of whether a specific natural material is suitable shall be made by the Engineer on the above basis.

6. Unsuitable Materials: any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, that is not satisfactory for use as fill material.

B. Reference Standards

1. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

2. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete

3. ASTM C330 - Lightweight Aggregates for Structural Concrete

4. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils

5. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

6. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m^3))

8. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

9. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

10. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Cylinders

11. ASTM D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)
12. ASTM D6024 - Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application
13. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
14. NYSDEC regulations, 6 NYCRR Part 375, Environmental Remediation Programs
15. NYSDEC regulations, 6 NYCRR Part 360, Solid Waste Management Facilities General Requirements
16. NYC Building Code
17. American Association of State Highway and Transportation Officials (AASHTO) Standards
18. New York State Department of Transportation (NYSDOT) Standard Specifications
19. United States Army Corps of Engineers (USACE), Engineering and Design – Hydrographic Surveying Publication, EM 1110-2-1003.

1.05 DESCRIPTION

A. Recycled materials that the Engineer has evaluated and approved for general use shall be considered to be Suitable Material subject to the conditions for use as determined by the City. In general, the use of recycled materials must be sanctioned by NYSDEC, usually in the form of a BUD. See definition above.

B. Suitable fill material from an off-site source shall be non-hazardous and shall come from the following hierarchical sources:

1. Other DEP projects that have available, excess suitable materials;
2. The NYC Clean Soil Bank, located at 830 Forbell Street, Brooklyn, and managed by the Mayor's Office of Environmental Remediation (OER);
3. Beneficial Use Facilities; and
4. Commercial Facilities.

1.06 QUALITY ASSURANCE

A. Testing: The Contractor shall retain the services of an independent materials testing laboratory to perform the following laboratory and field tests.

B. All materials used in construction, whether brought to the site or developed from on-site sources, shall be tested for optimum moisture-maximum density curve, and reports of the test results for each source shall be submitted promptly. The tests shall be as follows:

Test	ASTM Standard	Tests Per Volume Delivered
Gradation	D422	1 per 200 C.Y.
Compaction or Density	D1557	1 per 200 C.Y.

C. Acceptability of completed compaction shall be demonstrated by tests performed by the Contractor and accepted by the Engineer. The minimum number of tests shall be determined by quantity of material placed, and reports of the test results shall be submitted promptly. The Contractor shall perform either of the following tests subject to the approval of the Engineer:

Test	ASTM Standard	Tests Per Volume Placed
In-Place Density	D2167 D6938	1 per 200 cy

D. Any fill material being brought to the site that is composed of soil or a mixture of soil (excluding gravel, crushed stone, limestone screenings, or other granular materials), as well as any soil being used for drainage fill, common fill and pipe bedding for small piping, must comply with the following protocol:

1. Testing shall be performed on all soil brought on-site (fill and topsoil) and shall demonstrate chemical quality meeting 6 NYCRR Part 360, Section 360.13(f), Table 2: Fill Material Beneficial Use, specifically Fill Type 2 maximum concentration levels.

2. Chemical analyses shall include the 6 NYCRR Part 375-6.8(b) compounds, including volatile organic compounds and asbestos, as detailed in Section 02 24 20 - Soil Sampling and Analysis. All analyses shall be performed by a testing laboratory certified by the New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH-ELAP). Based on visual observation, the volume of physical contaminants, if present, shall also be recorded

3. The frequency of testing per volume of fill shall be in accordance with 6 NYCRR Part 360.13 (e)(1), Table 1, Minimum Analysis Frequency for Fill purchased from a registered/permitted processing or recycling facility.

4. Notification to the NYSDEC must be made prior to the first load greater than 10 cubic yards is planned to be transported from the site of excavation directly to the site of reuse.

   a. At least five days in advance of transfers of Fill Types 2, 3, 4 and 5 generated in, imported to, or relocated within the City of New York.

   b. At least five days in advance of transfers of Fill Type 4 and Fill Type 5 anywhere in the State of New York.

   c. The Notification of Fill Transfer for Reuse form (NYSDEC Division of Materials Management, version 03/24 or latest) will be sent to the NYSDEC Regional Office in which the destination is

located. The form must be certified by a Qualified Environmental Professional (QEP). In the event the QEP is not a Professional Engineer or Geologist licensed in New York State, the QEP's basis for credential must be attached to the form.

E. When testing is required to confirm the reuse of on-site excavation spoils under a Case-Specific BUD, sample the soils in accordance with NYSDEC requirements.

1.07 SUBMITTALS

A. The Contractor shall submit shop drawings for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Name and location of all suppliers.
2. Certificate of compliance with standard specified for each source of material.
3. The Contractor shall submit all laboratory analytical reports, which shall include a Summary Table listing the analytical results with highlighted exceedances as defined in 6 NYCRR Part 360, Section 360.13 (f), Table 2: Fill Material Beneficial Use, as applicable.
4. Prior to stockpiling or placing of select fill materials at the job site, submit for approval approximately 100-pound samples representative of the fill at the proposed borrow source. In addition, submit documentation of the availability of the required fill quantities at any proposed borrow source.
5. Submit certified laboratory reports showing Coarse Aggregate conforms to specified requirements.
6. Submit optimum moisture – maximum density curves and reports for all fill materials before placement of fill.
7. Results of all compaction tests for fill placement.
8. Certification by the lightweight fill producer of the gradation, dry loose unit weight, dry compacted unit weight and Los Angeles Abrasion Test lost for the proposed lightweight fill source.

B. The Contractor shall submit to the Engineer, for approval, a site-specific Comprehensive Work Plan for foundation cleanup and underwater placement of Coarse Aggregate as shown on the Contract Drawings. The plan shall describe the means, methods, materials and equipment to be used and will provide a detailed approach as to how the work will be completed. The plan must be approved by the Engineer before any work associated with this item can begin. The Plan shall include the following:

1. The qualifications of personnel to be involved with the Work, including the following:
   a. The name and resume of the person(s) who will manage/direct the overall course of the underwater placement work.

b. The name and resume of the person(s) who will have full-time charge of the work.

2. The Contractor shall describe the means, methods and frequency for monitoring the grades of the placed materials. The proposed means shall provide for monitoring placement grades at no more than 0.1-foot centers.

3. The Contractor shall specify the equipment to complete the work.

4. The Plan shall describe the method(s) by which equipment will be moved around the site and the reservoir, including specific routes to the placement location. The Plan shall include the details for reservoir access to launch barge and material placement equipment, a description of the means by which barges and boats will be launched into the reservoir and details of providing land-to-water material loading. The Plan shall describe, in detail, all anchorage or rigging of the equipment and tools to prevent them from falling into the reservoir, and a detailed description of the means and method that will be used to place the coarse aggregate.

5. Material Handling: The materials associated with or generated from the activities are to be handled in accordance with the latest NYCDEP, OSHA standards, and all other applicable Federal, State and local permits and regulations.

6. The Comprehensive Work Plan shall be coordinated with Section 02 68 00 – Work on Reservoir and Diversion of Water.

C. The Contractor shall submit to the Engineer, for approval, bathymetric surveys within three (3) days of completion of each survey.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials delivered to the site shall be stored in a manner to prevent contamination and segregation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. General

1. Backfill shall be composed of suitable materials as defined in this Section.

a. On-site Materials: Material to be excavated and proposed for reuse as fill under Pre-Determined Beneficial Use must meet the requirements of 6 NYCRR Part 360, Section 360.13 (a), Applicability, Section 360.13 (b), Waste Cessation, or 360.12(c)(1)(iv)(a), Excavated material used to backfill the same excavation or as grade adjustment in areas of similar physical characteristics on the site of generation. If these criteria cannot be met, material shall meet Section 360.12(d), Case-specific beneficial use determinations - general. Fill may require sampling and analyses in accordance with Section 02 24 20 – Soil Sampling and Analysis designed and implemented by or under the direction of a qualified environmental professional (QEP). The Contractor shall maximize reuse of soil on-site for backfilling rather than import soil from other sources.

b. Off-site Imported Materials: Fill that is brought on site to be used as backfill must meet the requirements of 6 NYCRR Part 360, Section 360.13 (f), Table 2: Fill Material Beneficial Use for General Fill.

2. Follow common fill requirements whenever drainage or select fill is not specified. Determine and obtain the approval of the Engineer for the appropriate test method where more than one compaction test method is specified.

3. Do not use wet or frozen material for backfilling.

4. The maximum stone size shall be two-thirds of the thickness of the backfill lift, but in no case shall material containing stones over 10 inches in the largest dimension be used for backfill.

B. Drainage Fill

1. Use clean gravel, crushed stone, or other suitable material conforming to the gradation specified for drainage fill. Clay and fine particles are unacceptable in drainage fill. Provide drainage fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
1-1/2 inch	100
1 inch	95-100
1/2 inch	45-65
#4	5-15
#16	0-4

C. Select Fill

1. Use gravel, crushed stone, limestone screenings or other granular or similar materials, as approved, which can be readily and thoroughly compacted to

not less than 95 percent of the maximum dry density obtainable by ASTM D1557. Very fine sand, uniformly graded sands and gravels, or other materials that have tendency to flow under pressure when wet are unacceptable as select fill. Provide select fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70
#4	25-50
#10	15-40
#200	5-15

D. Common Fill

1. Material from on-site excavation may be used as common fill provided that it can be readily compacted to not less than 90 percent of the maximum dry density obtainable by ASTM D1557 and does not contain unsuitable material as per Article 1.04.A.6. Select fill may be used as common fill at no change in the Contract Price.

2. Granular on-site material that complies with the following gradation limits may be used as granular common fill:

U.S. Standard Sieve	Percent Passing By Weight
3 inch	100
#10	50-100
#60	20-90
#200	0-20

3. Cohesive site material may be used as common fill as follows:

   a. The gradation requirements do not apply to cohesive common fill.

   b. Use material having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20, as determined by ASTM D4318.

4. All material used as common fill is subject to approval by the Engineer. If there is insufficient suitable material on site, import whatever additional material is required which conforms to the sections, at no additional cost to the City.

E. Coarse Aggregate

1. Coarse Aggregate material, obtained from an offsite commercial source, shall conform to the requirements of Fine Stone Fill as specified in NYSDOT Standard Specifications, Section 620 Bank and Channel Protection.

F. Pipe Bedding

1. Gradation for Small Piping: For pipe 18 inches or less in diameter, use pipe bedding material of which 90 percent will be retained on a No. 8 sieve and 100 percent of which will pass a 1/2-inch sieve and be well graded between those limits.

2. Gradation for Large Piping: For pipe larger than 18 inches in diameter, use the same pipe bedding material as specified for smaller pipe or use a similar well graded material of which 90 percent will be retained on a No. 8 sieve, 100 percent will pass a 1-inch sieve, and will be well graded between those limits.

G. Compaction Equipment

1. Equipment and Methods: Perform all compaction with suitable approved equipment and methods.

2. Compact clay and other cohesive material with sheep's-foot rollers or similar equipment where practicable. Use handheld pneumatic tampers elsewhere for compaction of cohesive fill material.

3. Compact low cohesive soils with pneumatic-tire rollers or large vibratory equipment where practicable. Use small vibratory equipment elsewhere for compaction of cohesionless fill material.

4. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All stockpiled materials shall be adequately handled as required in Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

B. No material shall be placed until satisfactory test reports for material type and compaction requirements have been approved by the Engineer.

C. Warning tape/ribbon shall be placed and/or restored as required when backfilling new and existing utility lines.

3.02 IMPLEMENTATION

A. Backfill all excavations to the original surface of the ground or to such other grades as may be shown or required. For areas to be covered by lawn mix, leave or stop backfill 12 inches below the finished grade or as otherwise required to provide adequate depth of lawn mix to satisfy the requirements of Section 32 90 00 – Planting.

B. Remove from all backfill, and from the space being backfilled, any compressible, putrescible, or destructible rubbish and refuse before backfilling is started. Dispose of the rubbish and refuse in accordance with the requirements of Section 01 74 20 – Construction Waste Management.

C. Leave sheeting and bracing in place or remove as the Work progresses, as shown in the Contract Drawings, specified or directed by the Engineer.

D. Do not permit backfilling construction equipment to travel against or over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified provided the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

E. Electrical Duct and Structure Bedding

1. All electrical ducts and precast manhole bases shall be bedded in well graded, compacted, select fill material. Select fill shall be placed in uniform layers not greater than 9 inches in loose thickness and compacted in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557. Bedding thickness shall be not less than 6 inches after compaction. Bedding below electrical ducts shall extend the full width of the trench.

2. Existing underground structures, tunnels, conduits and pipes crossing the excavation shall be bedded with compacted select fill material. Place bedding material under and around each existing underground structure, tunnel, conduit or pipe and extend underneath and on each side to a distance equal to the depth of the trench below the structure, tunnel, conduit or pipe.

3. Cast-in-place manhole bases and other foundations for structures shall be cast against a concrete work mat in clean and dry excavations, unless otherwise shown, specified or required.

F. Coarse Aggregate

1. Underwater Placement: Coarse Aggregate to be placed under water shall meet gradation requirements in the bucket or container used for placing and shall be placed in lifts in a systematic manner directly on the subgrade so as to assure a continuous and uniform layer of well graded rock of the required thickness. Coarse Aggregate placed underwater shall be placed in the manner indicated and to the finished grades as shown on the Contract

Documents and in accordance with the approved Comprehensive Work Plan.

2. Bathymetric Survey: Multi-beam acoustic bathymetric surveys shall be performed in the area of the Coarse Aggregate placement and a minimum of 25 feet beyond the anticipated horizontal limits. The survey is to be completed in accordance with the United States Army Corps of Engineers (USACE) Engineering and Design – Hydrographic Surveying Publication EM 1110-2-1003. Prior to the survey(s), the sound velocity through the water column is to be determined and used to provide three-dimensional (x,y,z) data points topographic mapping accurate to the nearest centimeter. Prepare the existing conditions bathymetric mapping in the placement area in an AutoCAD (latest release) environment utilizing Civil3D surveying and engineering software. Placement area spot elevations are to be shown at 1.0-foot centers to the nearest 0.1 foot with contours shown at 0.5-foot intervals.

3. Prior to the performing the initial bathymetric survey, divers shall prepare the area for Coarse Aggregate placement by locating and moving/removing organic debris and other detritus that could hinder interlocking of existing stone fill or placement against the existing wing wall with the newly placed Coarse Aggregate. Large existing stones or adversely sloping stones that may cause Coarse Aggregate to roll or slip when placed shall be moved and/or flattened out as necessary to minimize loss of Coarse Aggregate downslope during placement and tamping.

4. After preparation of the area for Coarse Aggregate placement, perform an initial bathymetric survey of the area. Submit the bathymetric survey results for approval prior to initiating placement of Coarse Aggregate.

5. Place Coarse Aggregate in lifts not exceeding 12 inches in thickness to the nearest 0.5-foot. Tamp each lift of Coarse Aggregate to integrate the newly placed materials with the existing stone fill or the previous Coarse Aggregate lift. Tamping shall be performed using equipment, such as a plate, rods, piles, or other, that is suspended through the water column from a crane or other heavy equipment. Provide means to ensure the final grade is level to the extent practicable and within the tolerances in this Specification. Any slope of the finished grade, if present, shall be such that the outer edge of fill is higher than the interior sides abutting the dam face, wing wall, or existing embankment slope. Rake the final surface to smooth to finished grade.

    a. Contractor shall make dive communication and video of the underwater work available for real time review by the Engineer and shall record communications and/or video if requested. Placement operations may be stopped by the Engineer at any time visual observation of slope movement is made, or for other reasons deemed necessary by the Engineer.

b. Placement Control: Furnish, operate, maintain necessary equipment, and furnish all necessary material and supplies while maintaining control of the placement over the subgrade surfaces. At all times when placement is underway, the means by which the Contractor positions the plant, equipment, and Coarse Aggregate supply barges must function accurately and consistently. The kick-off method for placement shall not be used and Coarse Aggregate shall not be cast across the surface of the water. Whatever the method employed, it must readily permit the Contractor and the Engineer to determine the exact position of the placing operation. Anchors for the purpose of holding equipment in place shall be located outside the limits of fill placement and shall not adversely affect fill placement or stability of the embankment and wing wall.

c. Alignment Control: The method of alignment control may consist of piles or pile clumps. Other acceptable methods of alignment control include the use of manned transit, laser, sonar or either colored or polarized light beams, or any other method demonstrated to be practicable and sufficiently precise and reliable.

d. Distance Control: Acceptable methods include the use of electronic distance surveying instruments or other method demonstrable to be practicable and sufficiently precise and reliable.

e. Depth Finder: An electronic recording depth finder shall be provided during the underwater placement of Coarse Aggregate. The depth finder shall be capable of obtaining accurate profiles and cross sections during placement. Coarse Aggregate shall be placed to 0.0 to +0.5 feet above the grades indicated on the Contract Drawings.

f. At the completion of underwater Coarse Aggregate placement, the Contractor shall perform a bathymetric survey to at least the limits of the initial bathymetric survey or farther as directed by the Engineer.

G. Pipe Bedding and Initial Backfill

1. Place select fill by hand for initial pipe backfill from top of bedding to 1 foot over top of pipes in uniform layers not greater than 6 inches in loose thickness. Tamp under pipe haunches and thoroughly compact in place the select fill with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

2. Do not place stone fragments larger than 2-inch size in the pipe bedding or in the backfill to 1 foot over the top of pipes, nor any stone fragments larger than 3-inch size nearer than 2 feet from any pipe, conduit or concrete wall.

3. Pipe bedding containing very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet is unacceptable.

4. Bed pipelines or electrical ducts placed in short tunnels in select fill or 2500 psi concrete. Completely fill the remainder of the annular space between the outside of the pipe wall and the tunnel wall with select fill, suitable job-excavated material, or 2500 psi concrete, as approved. Pipes and ducts in short tunnels shall be supported to permit placing and compaction of backfill.

H. Trench Backfill

1. Backfill trenches from 1 foot over the top of the pipe, from the top of electrical duct bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required. Backfill trenches as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or pipe lines.

2. Provide select fill, suitable job-excavated material or other material, as specified and as approved for trench backfill.

3. Depth of Placement - General: Except under pavements, walkways, railroad tracks, and street or highway appurtenances, or as otherwise specified, place trench backfill in uniform layers not greater than 9 inches in loose thickness and thoroughly compact in place using suitable mechanical or pneumatic equipment. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

4. Depth of Placement - Traffic Areas and Under Utilities: Where pavements, walkways, railroad tracks and street or highway appurtenances are to be placed over trenches and under utilities or utility services crossing the trench, provide trench backfill using select fill placed in uniform layers not greater than 9 inches in loose thickness and thoroughly compacted in place with equipment as specified above. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

5. Depth of Placement - Undeveloped Areas: In undeveloped areas and where select fill material or hand-placed backfill are not specified or required, place suitable job-excavated material or other approved backfill in lifts not exceeding 12 inches in loose thickness. When the trench is full, consolidate the backfill by jetting, spading, tamping or puddling to ensure complete filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.

6. Backfill trenches in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance. Do not allow backfilling material from a bucket to fall directly on a structure or pipe and, in all cases, lower the bucket so that the shock of falling earth will not cause damage.

7. Break up lumps and distribute any stones, pieces of crushed rock or lumps which cannot readily be broken up, throughout the mass so that all interstices are solidly filled with fine material.

8. Retain backfill in trenches by temporary bulkheads only and remove them as the backfilling progresses. Do not make bulkheads of stone.

9. Do not cover sewers, drains, basin connections, ends of sewers and branches until the Engineer orders or gives permission to backfill.

10. After completion of backfilling, remove all surplus material, and regrade and leave free, clear, and in good order all roadways. Deposit and compact a temporary surface of asphalt, or other equivalent and suitable material to a depth of six inches on all backfilled areas where ordered by the Engineer in writing. Until areas are restored to their original condition, maintain the surface of the temporary pavement in good and safe condition and promptly fill all depressions caused by settlement of the backfill with the temporary surfacing materials and compact the same. Wet the temporary surface by spraying with water when necessary to prevent a dust nuisance.

I. Structure Backfill

1. Backfill excavations as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or structures.

2. Use select fill underneath all structures, and adjacent to structures where pipes, connections, electrical ducts and structural foundations are to be located within this fill. Use select fill beneath all pavements, walkways, and railroad tracks, and extend to the bottom of pavement base course or ballast.

   a. Place select fill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable approved mechanical or pneumatic equipment.

   b. Compact select fill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

3. When shown on the Contract Drawings, or approved by the Engineer, lightweight fill shall be used to raise the grade in areas that are to support pavements, walkways, railroad tracks and other structures.

   a. Place lightweight fill in uniform horizontal layers not greater than 12 inches in loose thickness.

   b. Lightweight fill shall be compacted by four complete coverages with an approved smooth drum vibratory roller having a minimum static weight of 14,000 pounds, a minimum dynamic force of 23,000 pounds, and a total force not less than 5,500 pounds per foot of compactor drum width.

4. Use of common granular fill adjacent to structures in all areas not specified above, unless otherwise shown or specified. Select fill may be used in place of common granular fill at no additional cost.

   a. Extend such backfill from the bottom of the excavation or top of bedding to the underside of the lawn mix for seeded, sodded or

hydroseeded areas, the top of previously existing ground surface or to such other grades as may be shown or required.

b. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable equipment, as specified above.

c. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

5. In unpaved areas adjacent to structures, for the top 1 foot of fill directly under the lawn mix, use cohesive backfill conforming to Article 2.02.D.3, placed in 6-inch lifts. The cohesive backfill shall extend to the limits of the excavated area. Compact to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

6. When sheeting is withdrawn, solidly fill all cavities in or adjoining the trench or other excavation. When sheeting is left in place, solidly fill all cavities behind such sheeting.

J. Earth Embankments

1. Make all earth embankments of approved cohesive common fill material.

2. Place fill in uniform layers not greater than 10 inches in loose thickness. Compact in place with suitable approved mechanical equipment.

3. Compact earth embankments to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

4. Do not use cohesionless, granular material as earth embankment backfill, unless otherwise shown or required.

K. Finish Grading

1. Perform finish grading in accordance with the completed contour elevations and grades shown on the Contract Drawings and blend into conformation with remaining natural ground surfaces.

a. Leave all finished grading surfaces smooth and firm to drain. Areas shall be finished to the degree obtainable by either blade or scraper operations and suitable for application of topsoil.

b. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.

c. Areas which are anticipated to be undisturbed for a period of more than 30 days shall receive temporary seeding of rye grass at a rate of three bushels per acre, weather and season permitting. This seeding shall be repeated as necessary to maintain a continuing ground cover.

2. Grade outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or where shown,

extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.03 FIELD TESTING / QUALITY CONTROL

A. Sampling and Testing of Select, Common and Lightweight Backfill:

1. Provide sampling, testing, and laboratory methods in accordance with ASTM D1556 or other method as determined by the Engineer for select fill and common fill.

2. Lightweight fill shall be tested as specified herein.

3. Subject all backfill to these tests to the satisfaction of the Engineer. These tests shall be the basis for acceptance or rejection by the Engineer of the compaction. Failure to achieve the specified densities shall require the Contractor to recompact or remove the material as required.

B. Sampling and Testing of Coarse Aggregate:

1. Provide sampling, testing and laboratory methods in accordance with ASTM D422 or other methods as determined by the Engineer.

C. Correction of Work:

1. Correct any areas of unsatisfactory compaction by removal and replacement, or by scarifying, aerating or sprinkling as needed and recompaction in place prior to placement of a new lift. The Contractor shall, if necessary, increase the compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the lift thickness. The Contractor shall adjust the moisture content of the soil to bring it to the optimum range by drying or adding water, as required.

2. Correct any depression which may develop from settlement in backfilled areas within one year after the work is fully completed. Provide, as needed, backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement, and perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 31 25 10 - DUST, SOIL EROSION AND SEDIMENT CONTROL
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures and maintenance of storage areas as directed by the Engineer.

B. The Contractor shall provide an Erosion and Sediment Control Plan (E&SCP) that establishes methods and procedures to prevent migration of contaminated stormwater and sediment and to prevent erosion of features of the Work.

C. The Contractor shall minimize erosion and prevent discharge of sediment to surface water features, watercourses, drainage systems, public streets or private property from construction activities. The Contractor shall provide methods to prevent construction activities from generating contaminated stormwater runoff. Methods of constructing berms and dikes to direct clean stormwater runoff around the work area to the local drainage system shall be included.

D. The Contractor shall comply with all Federal, State, or local laws, codes, ordinances, and regulations which govern the control of sediment, erosion, and stormwater during construction activities.

E. The Contractor shall provide Best Management Practices (BMPs), including, but not limited to silt fences, straw bales, diversion dikes, swales, sedimentation basins/traps, truck wash areas/decontamination stations, stabilized construction entrances and/or other means as a temporary structural practice to minimize erosion and sediment runoff.

F. The Contractor shall implement dust, erosion, and sediment control and stormwater pollution prevention in accordance with the requirements of the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, and, if applicable, in accordance with the approved Stormwater Pollution Prevention Plan (SWPPP) for this contract prepared by the Engineer.

G. If applicable, the approved SWPPP for this contract will be made available to the Contractor upon request during the bidding process. Proposed modifications to the approved SWPPP shall be in accordance with the requirements of this Section.

H. The Contractor shall control dust caused by operation and movement of vehicles and equipment in accordance with the latest DEP and OSHA standards, and all other applicable Federal, State and local regulations.

I. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2

1.04 References 2
1.05 Description 3
1.06 Quality Assurance 6
1.07 Submittals 7
1.08 Delivery, Storage, and Handling 10
1.09 Spare Parts, Special Tools, and Supplies 10
1.10 Warranty 10
PART 2 PRODUCTS 10
2.01 Manufacturers 10
2.02 Materials / Equipment 10
2.03 Fabrication / Assembling / Finishes 11
2.04 Source Quality Control / Shop Tests 11
PART 3 EXECUTION....12
3.01 Examination / Preparation 12
3.02 Implementation 12
3.03 Field Testing / Quality Control 14
3.04 Startup / Demonstration 14
3.05 Adjusting / Protection / Cleanup....14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 74 17 – Cleaning and Site Maintenance

C. Section 02 24 20 – Soil Sampling and Analysis

D. Section 32 90 00 – Planting

E. Section 46 66 00 – Water Treatment Systems

1.04 REFERENCES

A. Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.

1. NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-25-001, or latest version)

2. New York City Watershed Regulations (April 4, 2010, or latest version)

3. New York State Standards and Specifications for Erosion and Sediment Control (aka “Blue Book”) (NYSDEC, November 2016, or latest version)

4. New York State Stormwater Management Design Manual (latest version)

5. New York State Department of Environmental Conservation (NYSDEC)

a. 6NYCRR Part 361-4 – Mulch Processing Facilities.

1.05 DESCRIPTION

A. Definitions

1. Best Management Practices: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, and have been approved by DEP or NYSDEC.

2. Commencement of Construction: The initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices.

3. Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as geological creep, detachment, movement of soil or rock fragments by water, wind, ice, or gravity.

4. Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sediment, and ensure that sediment-laden water does not leave the site.

5. Final Stabilization: All soil-disturbing activities at the site have been completed and uniform, perennial vegetative cover with the density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geo-textiles) have been employed on all unpaved areas and areas not covered by permanent structures, concrete or pavement.

a. Vegetative cover stabilization shall employ a Meadow Mix as per Section 32 90 00 – Planting.

6. Receiving Waters: Bodies of water or surface water systems receiving water from upstream manmade (or natural) streams

7. Sediment: Fragmented material that originates from weathering and erosion of rocks and unsolicited deposits, and is transported by, suspended in, or deposited in water.

B. Environmental Requirements

1. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Stabilization practices shall be implemented as approved by the Engineer. Seeding and planting shall be in accordance with Section 32 90 00-Planting. Temporary seeding shall utilize methods and materials as specified in Section 32 90 00 – Planting and the Contract Drawings. The

Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in Articles 1.05.B.1.a and 1.08.B.1.b below, stabilization practices shall be initiated as soon as practicable, but no more than fourteen (14) days after construction activities have temporarily or permanently ceased.

a. Unsuitable Conditions: Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.

b. Non-Winter month Temporary Inactivity Less than 14 Days: Where construction activity will resume on a portion of the site within 14 days after it temporarily ceases, no stabilization practices will be required.

c. Winter months Temporary Inactivity Less than 3 days: In winter months, where construction activity will resume on a portion of the site within 3 days after it temporarily ceases, no stabilization practices will be required.

2. Erosion and Sediment Control: Erosion and Sediment control BMPs shall be operational at all times during the Work, specifically during excavation, backfilling and restoration, and decontamination operations. The sediment and erosion control system shall be capable of handling stormwater during construction. Damage to excavation slopes and the migration of contaminated soil to downstream areas resulting from storm events shall be repaired or remediated by the Contractor, at the Contractor's expense.

3. Stormwater: At no time shall the Contractor allow stormwater runoff from soil excavation/stockpiling operations, or effluent from decontamination operations to migrate off to contaminate soils in other areas or percolate into the groundwater. The Engineer will monitor any overflow or leakage that occurs, and may at his discretion require the Contractor to perform soil sampling within all areas affected by such overflow. Any soils that have been contaminated by such overflow shall be removed, treated and disposed of by the Contractor at no additional cost to the City. All sampling and analyses of soils required to determine the contamination or remediation of these soils shall be performed in accordance with Section 02 24 20 – Soil Sampling and Analysis.

4. Disposal of Water: Water collected from decontamination areas and dewatering operations shall be handled in accordance with Section –46 66 00 – Water Treatment Systems.

5. Concrete Washout Debris: In accordance with NYC Local Law 70 of 2011 concrete washout shall not be allowed to enter the sewer. Concrete washout

muck and debris shall be removed and adequately disposed by the Contractor at no additional cost to the City.

C. Project Conditions

1. Existing Work: All BMPS (e.g., silt fences, straw bales, swales, sumps, pumps, piping) and other sediment/stormwater controls shall be installed such that other aspects of the Work are not adversely impacted or endangered. All installations shall be subject to the approval of the Engineer.

2. Dust Control: The Contractor shall be responsible for controlling visible dust caused by Work operations and the moving of vehicles and equipment. Dust control shall be implemented when soils are exposed, before, during and after Work activity ceases. Dust control will also be required on the weekends. The Contractor shall utilize the application of water or other methods, subject to the Engineer's approval, when visible dust is present on-site, in accordance with the Health and Safety Plan. The use of chemicals for dust control, including calcium chloride, will not be permitted.

   a. All excavation or collection, loading and transport of materials shall minimize the formation of dust. To prevent dust generation, application of water to roadways and active work areas shall be utilized as required. The Contractor's operations shall include air monitoring and dust minimization measures, consistent with the Health and Safety Plan (HASP) Specifications.

3. Silt and Sediment Disposal: All silt and sediment which accumulates behind any BMPs used on the site (i.e., straw bale berms or silt fences) shall be removed and disposed of off-site in accordance with all applicable Federal, State and local regulations.

D. Installation and Maintenance

1. All installation of erosion and sediment control BMPs must be consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must submit modified practices as part of the Contractor's Erosion and Sediment Control Plan, demonstrate equivalence to the technical standard, obtain the Engineer's approval and update the project SWPPP accordingly.

2. Maintenance: The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition at all times consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual.

1.06 QUALITY ASSURANCE

A. Permits and Regulations:

1. The Contractor shall obtain all necessary permits and be responsible for implementing the terms and requirements of these permits as needed and for payment of all fees.

2. The Contractor shall handle all material in compliance with applicable requirements of OSHA and other governing authorities having jurisdiction.

3. Certifications. The Contractor must sign a copy of the certification statements below, as provided in GP-0-20-001 (or certifications in latest version), before undertaking any construction activity at the site identified in the SWPPP. All certifications must be included in the SWPPP.

a. "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the NYCDEP must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001, or latest version) and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

b. The certification statements must include the name and title of the person providing the signature, address and telephone number of the contracting firm, the address of the site, and the date the certification is made. The certification must be signed by an authorized representative of the firm.

4. Inspections.

a. Maintenance Inspections: A trained contractor shall inspect the erosion and sediment control practices and pollution measures being implemented within the active work area daily to ensure that they are always being maintained in effective operating conditions. If deficiencies are identified, the Contractor shall begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

b. Qualified Inspector Site Inspections: The Contractor shall coordinate inspections with the Construction Manager's Qualified Inspector. Qualified Inspector Site inspections are conducted a minimum of twice every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days. The Contractor shall begin implementing any corrective

actions identified by the Qualified Inspector within one business day and shall complete the corrective actions in a reasonable time frame.

5. Stabilization. The contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased.

6. The SWPPP shall be kept current on file at the construction site for review by a NYSDEC inspector. If there is a significant change in construction which may have a significant effect on the potential for the discharge of pollutants to surface waters of the State and which has not otherwise been addressed in the SWPPP, it would require that the SWPPP be updated to reflect those required changes. The SWPPP would also require an amendment if the SWPPP proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified in the SWPPP or achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity. Additionally, the SWPPP shall be amended to identify any new subcontractor and their associated responsibilities.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other documentation, required to show conformance to the requirements of the Contract Drawings, for the approval to the Engineer. Shop Drawings shall show details of the Sediment and Stormwater Control System. The Submittals shall include, but not limited to the following:

1. Plan locations of all components of the Sediment/Stormwater Control System.

2. Details of all applicable BMPs (e.g., silt fence, diversion dike, straw bale berm, decontamination stations, etc.).

3. All of the planned components of the Erosion and Sediment Control Plan, as detailed below in Article 1.07.

4. All components of the SWPPP to be constructed on site, as detailed in Article 1.07 below.

5. The Contractor shall submit manufacturer's descriptive literature and installation instructions for stockpile liner and cover material as specified in Articles 2.02.A and 3.02.A.

B. Erosion and Sediment Control Plan (E&SCP): The Contractor shall develop and submit to the Engineer for approval, prior to commencement of construction activities, an E&SCP. The E&SCP shall address schedules and measures that will be taken to prevent migration of contaminated stormwater/sediment, and to prevent erosion of features of the Work. The E&SCP shall include the following at a minimum:

1. Measures to capture and mitigate stormwater runoff from active, disturbed areas.

2. Provisions for silt fences and other measures to limit migration of sediments.

3. Provisions for straw bale berms and silt fences or other measures to prevent contaminant and sediment migration.

4. Diversion of stormwater: The Contractor shall include provisions for controlling stormwater runoff in and around excavation areas.

5. Soil Storage Area: All details of temporary soil storage to be implemented as specified in this section.

6. Soil Stabilization Practices: All details of soil stabilization practices to be implemented, as specified in this section.

7. Culvert inlet, culvert outlet and channel protection in accordance with Section 31 35 10 – Embankment and Channel Protection.

8. Provisions for all other applicable Best Management Practices.

C. The Contractor shall adopt the approved SWPPP prepared by the Engineer for this Contract, if applicable. If the Contractor proposes to modify the approved SWPPP, the Contractor shall develop and submit to the Engineer for approval the modified SWPPP in accordance with the requirements of the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity. The modified SWPPP shall be developed and submitted to the Engineer for approval prior to the initiation of construction activities. The modified SWPPP must be in compliance with the requirements of this Section in all respects. The Contractor shall bear sole responsibility for all permitting requirements of, and coordination with, the governing authorities having jurisdiction, as well as for any costs and delays resulting from the modification(s).

The SWPPP shall include the following at a minimum:

1. Provide background information about the scope of the project, including the location, type and size of project;

2. Provide a site map for the project, including a general location map. The site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s);

3. Provide a map and a description of the soil(s) present at the site;

4. Provide a Construction Phasing Plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version), there shall not be more than five (5) acres of

disturbed soil at any one time without prior written approval from the NYSDEC;

5. Provide a description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater discharges;

6. Provide a description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater, and spill prevention response;

7. Describe the temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project closeout;

8. Identify and show on a site map the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

9. Provide the dimensions, material specifications, and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins;

10. Identify temporary practices that will be converted to permanent control measures;

11. Provide an implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and the placement and the duration that each practice should remain in place;

12. Provide a maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practices;

13. Provide the name(s) of the receiving water(s);

14. Provide a delineation of SWPPP implementation responsibilities for each part of the site;

15. Provide a description of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and

16. Provide any existing data that describes the stormwater runoff characteristics at the site.

D. Inspection Reports: The Contractor shall conduct inspections and submit inspection reports consistent with requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version) including:

1. Site inspections shall be conducted by the Qualified Inspector.

2. Site inspections are conducted a minimum of once every seven (7) calendar days and twice every seven (7) calendar days for sites with greater than 5 acres of soil disturbance. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. Site inspections are conducted a minimum of once every seven (7) calendar days and twice every seven (7) calendar days for construction activity of any size located in the New York City Watershed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

4. Inspection reports shall be maintained in a logbook at the site with SWPPP and other required documentation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall store, handle, and remove material and equipment consistent with requirements of the SWPPP and NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-20-001) or latest version.

B. Removal of all waste shall be in accordance with the requirements of Section 01 74 20 – Construction Waste Management.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Materials

1. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must submit modified practices as part of the Contractor's Erosion and Sediment Control Plan, demonstrate equivalence to the technical standard, obtain the Engineer's approval and update the project SWPPP accordingly.

2. Stockpile cover and liner fabric shall be a composite structure of fiber-reinforced polyethylene (RPE) fabric (minimum 20-mils). The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalis and acids. Its permeability coefficient shall be less than 10^{-3} cm/sec.

3. Erosion Control Blanket shall meet the following requirements:

a. Be a type of rolled erosion control product that is fully biodegradable with a functional longevity of a minimum of 12 months.

b. It shall be comprised of weed-and pest free wood fiber, straw, jute mesh or combination thereof, at a minimum unit weight of 10 ounces per square yard and a triple netted layer of biodegradable material.

c. Staples shall be used to anchor the blanket to the bare soil surface.

d. Erosion Control Blanket shall meet the following requirements:

1) Be of a uniform open plain weave of undyed and unbleached single jute yarn averaging 190 pounds per spindle of 14,400 yards. This yarn shall be of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one-half its normal diameter.

2) The width of the jute mesh shall be approximately 45 inches or as specified or approved. Jute mesh shall be woven as follows:

a) Approximately 60 warp ends per yard of width;

b) Approximately 40 weft ends per lineal yard.

3) Weight of Jute Mesh shall average 1.44 pounds per square yard (plus or minus 5%).

e. Wire staples: Shall consist of 12-inch lengths of No. 11 gauge wire bent to form a "U", or other wire staples as approved.

f. Wood Pegs: Shall be wedge shaped, approximately one inch by two inches by six inches (1" x 2" x 6”).

4. Compost shall meet the following requirements:

a. Be well decomposed, aerobically composted at least 3 months, with no objectionable odors;

b. Be weed-free, organic matter, containing less than 1%, by dry weight, of man-made foreign materials; and

c. Be in accordance with the Blue Book Table 5.2 - Compost Standards Table, except that the 100% of the material shall pass through the 1/2% sieve.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Stockpiling

1. Cover and Liner Requirements

a. Soil Stockpiles: Stockpiles of excavated soil to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD, or stockpiles of other soil mixes being brought onsite for landscaping purposes, shall be stored as follows:

1) Contaminated Soil: Stockpiles of excavated soil that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RPP fabric, as specified in Article 2.02.A above.

2) Uncontaminated Soil: Stockpiles of excavated uncontaminated soil shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in Article 2.02.A above.

3) Delaware Aerator Topsoil Pile: Delaware Aerator Topsoil pile, as shown in the Contract Drawings, shall be stabilized in accordance with the NYSDEC Blue Book; a bottom liner is not required.

b. Demolition Waste Stockpiles: Stockpiles of demolition waste that are to be recycled (on-site or off-site) or disposed of at a sanitary landfill shall be stored as follows:

1) Contaminated Demolition Waste: Stockpiles of demolition waste that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RFP fabric, as specified in Article 2.02.A above.

2) Uncontaminated Demolition Waste: Stockpiles of uncontaminated demolition waste shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in Article 2.02.A above.

c. Stockpiles of materials classified as contaminated, hazardous waste shall be stored with a cover and liner as specified above for contaminated soil or contaminated demolition waste, and transported off-site promptly in DOT-approved hazardous waste

shipping containers. Temporary hazardous waste storage areas shall comply with and the requirements of the Contract and applicable Federal, State and local regulations.

d. All stockpiles shall be covered during non-working hours and during periods of no construction activity. The terminal edges of the fabric cover panels shall be secured to prevent uplift by wind.

2. Stockpile Areas and Placement

a. Stockpiling of excavated materials will be permitted on-site within areas as designated on the Contract Drawings for construction staging, or as directed by the Engineer. All stockpiling areas on-site must be approved by the Engineer in advance.

b. The Contractor shall make his or her own arrangements to provide additional stockpiling area on-site or off-site, if required, for excavated material at no additional cost to the City. Additional stockpiling areas whether on-site or off-site shall be approved by the Engineer.

c. Stockpiles of excavated material to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD shall be so piled and placed as not to encumber sidewalks or roadways, or wash away or obstruct the free flow of surface or drainage water. Stockpiles shall be suitably bermed for run-off containment of any water that drains from the soils.

d. Stockpiles shall not be placed closer to the edge of an excavation than a distance equal to 1-1/2 times the depth of the excavation, unless the excavation is in rock or the sides of the excavation have been sloped or sheeted and shored to withstand the lateral forces imposed by such superimposed loads.

B. The Contractor shall provide winter stabilization in accordance with Section 2.38 of the NYS Standards and Specifications for Erosion and Sediment Control (Blue Book). The winter stabilization standards apply to all construction activities involved with ongoing land disturbances and exposure between November 15th to the following April 1st. The Contractor shall provide the following:

1. Snow Management Plan
2. 25 ft. perimeter buffers
3. Tall marker stakes for silt fence
4. 2 rows of silt fence if within 100ft. of a waterbody
5. Clear flow paths to drainage structures
6. Soil stockpiles shall be stabilized
7. Soil stabilization performed daily
8. Provide 2x normal mulching rate

C. The Contractor shall provide soil restoration in accordance with Table 4.6 Soil Restoration Requirements of the Blue Book to the subgrade soil, prior to placement of topsoil or planting materials. The soil restoration standard shall be applied to areas where heavy construction traffic has occurred, or as specified by the Contract Drawings prior to final stabilization. The Contractor shall:

1. Apply 3 inches compost, as specified in Section 2.02.A.4 above, over the subgrade soil.
2. Till compost into the subgrade to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
    a. No light-duty chisel plows shall be used.
3. All stone or rock material greater than four inches shall be removed from the subgrade.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection of soil and material stockpiles shall be done daily to ensure the integrity of the cover and liner is maintained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. The Contractor shall clean the site and equipment consistent with requirements of the SWPPP and the current New York State Standards and Specifications for Erosion and Sediment Control, Section 01 74 17 – Cleaning and Site Maintenance and Section 31 10 10 – Site Clearing. Where appropriate, truck wash/decontamination stations shall be installed to minimize the migration of sediment off-site as specified herein**.**

END OF SECTION

SECTION 31 71 22 – HAND TUNNELING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall furnish all labor, equipment, materials, and supplies required for tunnel construction. Hand tunneling methods using pneumatic hand tools shall be used to excavate the tunnel.

B. Work shall be done in accordance with the Contract Documents, and all Federal, State and local laws, regulations, and requirements.

C. Contractor is solely responsible for safety. Comply with all OSHA regulations including, but not limited to, 29 CFR Part 1926. Obtain all required permits for confined space entry.

D. Contractor-selected tunneling techniques shall include all equipment, associated support systems, guidance systems required to meet line and grade tolerances, initial tunnel support materials as required to maintain tunnel roof stability, transport spoils, and accomplish productivity assumed in Contractor's bid.

E. The Contractor shall furnish all labor, equipment, and material required to complete the work including but not limited to the following:

1. Pneumatic hand tools and equipment, and all related supplies appropriate for the prevailing cyclopean concrete and upstream masonry facade conditions,
2. Removal of tunnel spoil,
3. Supplying and installing of initial tunnel support,
4. Installation of outlet pipe and associated blocking and support,
5. Bulkheads and concrete cradles, and
6. Concrete backfill of annular space between excavated tunnel and outlet pipe.

F. The dimensions of the cross-section of the tunnel excavation are shown on the Contract Drawings and shall be excavated within + 2 inches and – 1 inch.

G. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2

1.06 Quality Assurance 3
1.07 Submittals 3
1.08 Delivery, Storage, and Handling 5
1.09 Spare Parts, Special Tools, and Supplies 5
1.10 Warranty 5
PART 2 PRODUCTS 5
2.01 Manufacturers 5
2.02 Materials / Equipment 5
2.03 Fabrication / Assembling / Finishes 5
2.04 Source Quality Control / Shop Tests 5
PART 3 EXECUTION.....5
3.01 Examination / Preparation 5
3.02 Implementation 5
3.03 Field Testing / Quality Control 8
3.04 Startup / Demonstration 8
3.05 Adjusting / Protection / Cleanup.....8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 72 15 - Initial Tunnel Support

B. Section 31 74 20 - Installation of Outlet Pipe

C. Section 31 74 22 - Tunnel Backfilling

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Verification of Dimensions and Coordination

1. The Contractor shall become familiar with all details of the work, verify all dimensions and locations in the field and advise the Engineer of any discrepancy before performing any work.

2. The Contractor for this Contract shall notify other Contractors in advance of the installation of the work included herein to provide the other Contractors with sufficient time for the installation and coordination of

items that may be required to be installed in conjunction with the work included in this Section.

3. Work shall be coordinated with placement of any required embedment as stipulated in the Contract Documents.

B. Job Conditions

1. The downstream spillway steps were reconstructed under Contract CAT-212B circa 2012-2014 using Class 40M reinforced concrete. Details are included in the Contract Reference documents.

2. The original dam material to be tunneled is unreinforced cyclopean concrete, which consists of a concrete matrix infused with "plumstone" boulders (sandstone). The upstream face of the dam has a stone masonry façade comprised of stone similar to the plumstones. The following are estimated engineering properties pertinent to the design and performance of hand tunneling:

a. Concrete Compressive Strength: ~4,500 psi.

b. Concrete Unit Weight: ~143 pcf.

c. Plumstone/Facade Compressive Strength: ~12 – 25 ksi (20 ksi, avg).

d. Plumstone/Facade Unit Weight: ~162 pcf.

e. Plumstone size varies: 3½ inch to >5 feet; average encountered in concrete cores ~15 inches (as intercepted by exploratory cores).

f. Plumstone volume within cyclopean concrete: ~7% – 10%.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not limited to:

1. Qualifications for the Contractor and Contractor personnel performing the work described in this Section:

a. The Contractor shall have a minimum of five (5) years of experience related to hand mining of tunnels.

b. Work shall be supervised by at least one (1) person with five (5) years of recent previous experience in hand tunneling and ground support installation.

c. Two (2) tunnel projects completed in the last 10 years performed using hand tunneling in ground conditions similar to those expected on this project.

d. Provide resumes and written documentation of the qualifications of the project manager, project superintendent and shift foremen.

2. Detailed plan for staging and supporting the tunneling operation.

3. Method of tunnel excavation through the different existing dam materials and initial ground support.

4. Details of lighting and ventilation systems, including type and output.

5. Method for alignment control.

6. Drawings and design details for a temporary working platform at the entrance to the tunnel. Design and calculations for the temporary working platform shall be signed and sealed by a licensed Professional Engineer registered in the State of New York.

7. Number and duration of shifts planned to be worked each day in accordance with restrictions on work hours.

8. Sequence of work/operations.

9. Procedures for handling, control and disposal of surface water, water input to the tunnel by Contractor, and seepage inflow.

10. Method of spoil transportation from the tunnel face up to the surface storage, and disposal location.

11. Survey methods and proposed procedures for alignment and grade control.

12. Ventilation Plan: Ventilation plan to include a written description, and drawings. The Ventilation plan shall be designed by a competent person with at least five (5) years of recent on-the-job experience on similar projects, involving tunnels of similar sizes constructed by similar methods. Provide qualifications of Designer.

13. Daily Reports: A shift log shall be maintained on a daily basis by Contractor. Submit reports no later than 24 hours after the end of the shift to the Engineer. Daily reports shall include at a minimum the following:

    a. Location of face by station and progress of tunnel drive at the end of each shift.

    b. Hours worked per shift on tunneling operations, equipment and materials used, and duration of different activities performed.

    c. Completed field forms for checking line and grade of the tunneling operation, showing achieved tolerance relative to design alignment.

    d. Any unusual conditions or events.

    e. Reasons for operational shutdown whenever no progress was made.

    f. Air quality reports for dust, toxic and hazardous gases, and other atmospheric impurities in the working environment.

14. Record Drawings: Maintain at the construction site a complete set of field drawings for recording of as-built conditions. All marks and notes shall be dated, and thorough. Submit the following:

    a. Record of actual locations of tunnel face excavation with elevations. Elevations shall be taken at every 10 feet and recorded to the nearest eighth of an inch (0.01 feet).

    b. Horizontal coordinates of all surveyed points shall be on the coordinate system utilized by the Owner.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall accept material on site and inspect for damage.

B. The Contractor shall handle, support and store material to prevent injury or damage to the material.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Initial tunnel support shall be in accordance with Section 31 72 15 – Initial Tunnel Support.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Tunneling shall not begin until the following have been completed:

1. Required submittals have been made and the Engineer has reviewed and accepted all submittals.
2. Notify the Engineer at least 20 days before beginning tunnel excavation.
3. Working platform at the entrance to the tunnel has been constructed.
4. A Safety Officer shall have designated and prepared a Health and Safety Plan in accordance with OSHA requirements for tunnel construction. The Safety Officer shall have held safety meetings and provided safety instruction for new employees as required by OSHA.
5. Pre-installation meeting has been held and all comments have been addressed from the meeting.

B. Furnish all necessary equipment, power, water, and utilities for tunneling, removal and disposal of spoil, tunnel backfilling, and other associated work required for the Contractor's methods of construction.

C. Ventilation

1. Furnish and operate a temporary ventilation system and air monitoring system conforming to the requirements of OSHA at all times that personnel are underground. Operate and maintain a ventilation system that provides a sufficient supply of fresh air and maintains an atmosphere free of toxic or flammable gases in all underground work areas.
2. Before any personnel enters the tunnel, the air quality must be tested and verified that the OSHA requirements pertaining to air quality are met or exceeded.

D. Barricades

1. Protect tunnel entrance with security fencing and with additional measures approved by the Engineer as required to prevent unauthorized personnel from accessing.
2. During non-work hours, isolate with additional measures approved by the Engineer as required to prevent unauthorized personnel from accessing.

E. Air Quality: Contractor shall provide equipment to maintain proper air quality of tunnel operations during construction in accordance with the requirements of 29 CFR Part 1926, Subpart S, Underground Construction. In addition, Contractor shall provide portable multi-gas detectors to measure oxygen (O2), carbon monoxide (CO), hydrogen sulfide (H2S), and lower explosive level of combustible gas (LEL) concentrations continuously at the heading when the tunnel is occupied by personnel.

F. Lighting Fixtures: Contractor shall enclose lighting fixtures in watertight enclosures with suitable guards and provide separate circuits for lighting and other equipment.

G. Electrical Systems: Electrical systems shall conform to requirements of National Electrical Code – NFPA 70.

H. Fire Suppression: Contractor shall furnish, install, and maintain a fire suppression system in accordance with all local, State, and Federal requirements.

I. Install initial tunnel support in accordance with methodology provided by Contractor's Design Engineer.

1. As soon as it is practical after commencing tunnel excavation, install two full length rock dowels for testing in accordance with Section 31 72 15 – Initial Tunnel Support.

J. If tunnel conditions require changes to the installation method or material, the Contractor shall submit complete information on proposed changes to Engineer for review prior to making any changes.

K. Transport and dispose of all excavated materials properly away from the construction site. Tunnel spoil shall be disposed of at legal disposal facilities.

L. Perform all tunneling operation by methods and with equipment which will positively control dust, fumes, vapors, gases, fibers, fogs, mist and other atmospheric impurities in accordance with OSHA safety requirements.

M. Establish benchmarks and survey control points. Benchmarks and control points shall be established by a licensed Surveyor registered in the State of New York.

N. Verify benchmarks prior to start of construction and report any errors or discrepancies to the Engineer.

O. When satisfied that all benchmarks are correct, use these benchmarks to furnish and maintain all reference lines and grades for tunneling. Use these lines and grades to establish the location of the tunneling guidance system. Submit to the Engineer copies of field notes used to establish all lines and grades and allow the Engineer to check set up prior to beginning tunneling. The Contractor remains fully responsible for the accuracy of the work and the correction of it, as required.

P. Maintain a means sufficient to control alignment and grade continuously.

Q. Contractor shall survey the crown, invert, and springline of the tunnel at 25-foot intervals or more frequently if line and grade tolerances have been exceeded, to ensure the alignment is within the tolerances specified.

R. If excavation is off-line or grade, notify Engineer immediately and make necessary alignment corrections.

S. Tunnel shall be clearly marked with paint every 10 feet along its length with stationing as indicated on the Drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Tolerances from lines and grades shown on the Contract Drawings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 31 72 10 – INITIAL TUNNEL SUPPORT
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The work described by this Section consists of furnishing all materials required for the initial tunnel support systems proposed by the Contractor to be provided as a part of the tunneling operations.

B. The work shall be done in accordance with the Contract Documents, and all Federal, State, and local laws, regulations and requirements.

C. Contractor is solely responsible for safety. Comply with all OSHA regulations including, but not limited to, 29 CFR Part 1926. Obtain all required permits for confined space entry.

D. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the

applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 71 22 – Hand Tunneling

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Verification of Dimensions and Coordination

1. The Contractor shall become familiar with all details of the work, verify all dimensions and locations in the field and advise the Engineer of any discrepancy before performing any work.

2. Work shall be coordinated with placement of any required embedment as stipulated in the Contract Documents.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not limited to:

1. All material required for the project under the submittal articles of the Sections listed in Article 1.03, Related Sections.

2. Design Calculations and Drawings for the Initial Tunnel Support prepared by a Professional Engineer Registered in the State of New York.

3. Rock Dowel Testing procedure to confirm rock dowel capacity meets or exceeds the design requirements.

4. Submit manufacturer's product data for all materials required to be incorporated into the work.

a. Manufacturer’s literature for the initial ground support elements and hardware.

b. Manufacturer’s recommended installation procedures for the initial ground support elements.

5. Certificates from the manufacturer stating that samples for testing are from normal stock.

6. Certified mill reports for the rock dowels, welded wire mesh and steel straps.

7. Manufacturer’s certified test results of gel time, shelf life, and working strength for each type of resin cartridge to be used.

8. Qualifications and experience for Contractor's personnel responsible for installation of initial tunnel support documenting that the proposed personnel meet the experience requirements.

9. Calibration certificates for equipment to be used for rock dowel testing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall accept material on site and inspect for damage.

B. The Contractor shall handle, support and store material to prevent injury or damage to the material.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Resin Grouted Rock Dowels

1. Furnish dowels with the standard end hardware supplied by the manufacturer including washers, nuts, and plates.

2. Bearing plates shall conform to ASTM A36 and meet the load/deflection criteria of ASTM F432.

3. Bearing plates against rock shall be a minimum of ½-inch thick and have a minimum bearing area of 36 square inches. Holes in bearing plates shall be reamed and beveled on the rock side and shall be large enough to permit 30 degrees of rock dowel skew in all directions from normal centerline.

4. Nuts shall be of the heavy-duty type, shall be compatible with rock dowels, and shall develop at least 125 percent of the minimum yield strength of the dowel bar.

5. Resin grout anchorages for rock dowels installed as initial support shall be capable of developing the minimum yield strength of the dowel bar.

6. Resin Cartridges

a. Supplied from a manufacturer that has produced resin cartridges for at least five years.

b. To consist of a high strength polyester with non-reactive inorganic filler. The materials shall have thixotropic and viscous properties to permit adequate mixing of the materials by spinning the rock dowel and to prevent the mixture from running out of the hole after mixing.

c. Compressive strength of the mixed and cured resin shall be not less than 14,000 psi when tested in accordance with ASTM C39. The shelf life shall be not less than six months.

d. Gel and cure time for resin shall permit proper installation in accordance with manufacturer's written recommendations. The cartridges shall be a minimum of 12 inches in length.

e. Use a quick setting cartridge at the back of overhead holes to hold the rock dowel in place while the slower setting resin sets up. The number of quick setting and slow-setting resin cartridges for rock dowels shall be sufficient to develop the minimum specified dowel capacity.

f. Store resin cartridges in accordance with the manufacturer's recommendations, in particular within the recommended temperature range. Store resin cartridges in the original manufacturer's boxes showing the expiration date. After their expiration date, resin cartridges shall not be used and shall be removed from the site.

g. Inspect resin cartridges prior to use. Do not use cartridges which have hardened or are ruptured or damaged.

B. Welded wire mesh shall conform to the requirements of ASTM A1064/A1604M and comply with the sire size and mesh opening size shown on the Drawings.

C. Steel straps shall be fabricated from structural steel conforming to ASTM A36 and sized as determined by the Contractor's Design Engineer.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Tunneling shall not begin until the following have been completed:

1. Required submittals have been made and the Engineer has reviewed and accepted all submittals.
2. Notify DEP and Engineer at least 20 days before beginning tunnel excavation.
3. Working platform at the entrance to the tunnel has been constructed.
4. A Safety Officer has designated and prepared a Health and Safety Plan in accordance with OSHA requirements for tunnel construction. The Safety Officer shall have held safety meetings and provided safety instruction for new employees as required by OSHA.
5. Pre-installation meeting has been held, and all comments have been addressed from the meeting.

B. Drilling:

1. Drill holes to a uniform diameter for the entire length at the diameter and to the depth required for installation of the rock dowel.
2. Drill holes at the location and to the depth per the design prepared by the Contractor's Design Engineer.
3. Hole diameter for rock dowels shall be as recommended by the manufacturer to be compatible with the resin cartridges or the expandable friction dowel diameter.
4. Clean holes of all drill cuttings prior to inserting rock dowels.

C. Resin Grouted Rock Dowels:

1. Install resin grouted dowels following the manufacturer's recommendations.
2. Inspect the drill hole to ensure that it is clear of debris and rock fragments.
3. Prior to insertion, inspect the dowel threads for damage. Do not use dowels with damaged threads that would adversely affect installation of nut and face plate.
4. Insert individual resin cartridges into the hole using methods to prevent rupture and secure cartridges in the hole following the manufacturer's

recommendations. Use the number of cartridges per hole recommended by the resin cartridge manufacturer and confirmed by trials for the hole and dowel size combination to ensure complete encapsulation of the dowel.

5. Insert the dowel in the hole until it contacts the first cartridge. Rotate the dowel at the rate and duration recommended by the resin cartridge manufacturer. Hold the dowel until the resin has hardened sufficiently to keep the dowel in place.

6. Install the dowel and end hardware following the manufacturer's recommendations.

7. Tighten faceplates after the resin has set to a torque corresponding to approximately 10 percent of the yield capacity of the dowel.

D. Welded Wire Mesh

1. Scale rock surfaces prior to installation of welded wire mesh to remove loose rock.

2. Fasten welded wire mesh against excavated tunnel roof surface using rock dowels and plates and follow contours of tunnel roof surface.

3. Overlap welded wire mesh by a minimum of six inches at all seams between mesh panels. Coordinate the dimensions of the mesh with the rock dowel pattern so that the seams between mesh panels occur at the rock dowels and the rock dowels extend through both mesh panels at the overlap. Do not install mesh so that seams are between rock dowels.

E. Steel Straps

1. Prior to installing steel straps, the rock surface shall be scaled to remove loose rock.

3.03 FIELD TESTING / QUALITY CONTROL

A. General

1. Field test rock dowels in the presence of the Contractor's Design Engineer.

2. Rock dowel testing includes initial testing and production testing.

3. Provide the equipment for performing the rock dowel testing and maintain the equipment in good working condition.

B. Initial Testing

1. Initial testing of rock dowels includes testing of full-length rock dowels and anchorage testing of rock dowels. Rock dowels used for initial testing shall be the same dowels that will be used for the production dowels.

2. Conduct the test program at a location agreed to by the Engineer.

3. During installation of the test rock dowels, confirm that that the rock dowel installation procedures comply with the manufacturer's recommended installation procedures.

4. As soon as it is practical after commencing tunnel excavation, install two full length rock dowels for testing in the sidewall of the tunnel. Install the test rock dowels using the same equipment and personnel that will install the production rock dowels. Inspect the drill holes for the test dowels visually after drilling.

5. For each test, record as a minimum the following information:

   a. Test location.

   b. Dowel type, length, diameter, and bond length.

   c. Drillhole diameter.

   d. Description of rock material in which the dowels were installed and features that could affect the anchor capacity.

   e. Names of personnel that installed the dowels and performed the test.

   f. List of equipment used for testing with model and serial numbers as appropriate.

6. Testing full-length dowels: Test full length dowels to confirm that minimum pullout capacities are at least the specified design capacity for rock dowels.

   a. Pull the test dowels to a maximum design load. Record the displacement of the dowel head at each step. Hold the load for ten minutes and record the displacement at the end of the ten-minute period.

7. Evaluation of Test Results: If the pullout strengths of the full-length dowels do not meet or exceed the test load, the Contractor shall review their installation procedures used for the test dowels with the manufacturer to determine and correct the cause of the low pullout strengths.

C. Production Rock Dowel Testing

1. The Contractor’s Design Engineer will designate one out of each 20 installed rock dowels for testing.

2. Pull the rock dowels to the required design capacity and hold the load for 10 minutes.

3. The rock dowel shall hold the test load within ±5 percent for a period of 10 minutes.

4. Evaluation of Production Tests: Failure shall be considered as any rock dowel not sustaining the test load within ±5 percent for the 10-minute hold period. If the rock dowel fails, test two additional rock dowels designated by the Contractor's Design Engineer. If either of these two additional rock dowels fail the pull-out test, all of the remaining rock dowels represented by the tests shall be rejected by the Engineer. The Contractor may perform pull testing on the remaining rock dowels or replace all rock dowels with satisfactory rock dowels at no cost to the Owner.

5. Replace all rock dowels that fail to meet the pull-out test with satisfactory rock dowels at no additional cost to the Owner.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 31 74 20 – INSTALLATION OF OUTLET PIPE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY.

A. The work described in this Section covers handling, transporting, and installing the outlet pipe and drain pipe in the tunnel.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary.	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 71 22 - Hand Tunneling

B. Section 31 72 15 - Initial Tunnel Support

C. Section 31 74 22 - Tunnel Backfill

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Verification of Dimensions and Coordination

1. The Contractor shall become familiar with all details of the work, verify all dimensions and locations in the field and advise the Engineer of any discrepancy before performing any work.

2. The Contractor for this Contract shall notify other Contractors in advance of the installation of the work included herein to provide the other Contractors with sufficient time for the installation and coordination of items that may be required to be installed in conjunction with the work included in this Section.

3. Work shall be coordinated with placement of any required embedment as stipulated in the Contract Documents.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Outlet Pipe and Drain Pipe Installation Plan

1. Description of method of lowering pipe sections to the tunnel entrance, method of transporting the outlet pipe and drain pipe into tunnel; method of positioning, aligning, and jointing pipe. Include sketches showing method of carrier pipe transporting, hoisting, and positioning.

2. Buoyant force calculations, provisions to prevent flotation of outlet pipe and drain pipe during backfilling, anchoring design and bulkhead design. Submittal shall be sealed by a licensed Professional Engineer registered in the State of New York

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle and transport pipe into the tunnel in a manner that prevents damage to the pipe, joints and gaskets. Do not install pipe damaged during placement operations.

If any damage occurs, the Contractor may either replace the pipe or propose repair procedures for review and approval by the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Outlet pipe and drain pipe shall be as specified in Section 40 05 22 – Steel and Stainless Steel Process Pipe.

B. Timber shall not be used to support the outlet pipe or drain pipe. All support under the outlet pipe and drain pipe (blocking) shall be concrete and shall not be displaced during tunnel backfilling.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Tolerances from lines and grades shown on the Drawings

B. Prior to placement of outlet pipe and drain pipe, Contractor shall remove temporary tunnel utilities, loose material, dirt, standing water, and debris.

C. Temporary steel construction tracks may be left in place if they do not interfere with alignment and blocking of the carrier pipe and drain pipe, or interfere with final placement of the tunnel backfill, as approved by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Outlet pipe and drain pipe invert shall be surveyed and hydraulic grade line verified prior to backfilling of the tunnel.

B. Prior to installing the outlet pipe, Contractor shall verify that the initial tunnel support has been installed such that the outlet pipe can be placed in conformance with specified tolerances. See Section 31 72 15 – Initial Tunnel Support.

C. Prior to backfilling of the tunnel, the outlet pipe and drain pipe shall be tested in accordance with Section 40 05 05.30 – Leakage Testing for Exposed Piping.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 31 74 22 – TUNNEL BACKFILLING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The work described in this Section covers filling the annular space between the outlet pipe and the excavated tunnel perimeter with concrete.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete

B. Section 31 71 22 – Hand Tunneling

C. Section 31 72 15 – Initial Tunnel Support

D. Section 31 74 20 – Installation of Outlet Pipe

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Verification of Dimensions and Coordination

1. The Contractor shall become familiar with all details of the work, verify all dimensions and locations in the field and advise the Engineer of any discrepancy before performing any work.

2. The Contractor for this Contract shall notify other Contractors in advance of the installation of the work included herein to provide the other Contractors with sufficient time for the installation and coordination of items that may be required to be installed in conjunction with the work included in this Section.

3. Work shall be coordinated with placement of any required embedment as stipulated in the Contract Documents.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Quality Control: Submit qualifications of Contractor/Subcontractor, personnel, and manufacturer.

1. Qualifications: The Contractor or Subcontractor supplying and placing concrete shall be capable of developing a mix design, and batching, mixing, handling and placing the respective material under tunnel conditions; shall have furnished and placed the respective material on at least four tunnels of the general type and the size specified herein which have been in successful operation; and shall have a record of experience and quality of work using the respective material that is satisfactory to the Engineer.

B. Personnel Qualifications: Workers, including the Contractor's superintendent and foreman, shall be fully qualified to perform the work. The concrete Contractor's superintendent shall have previous experience under similar ground and tunnel conditions with the respective material.

C. Product Data: Mix design for concrete proposed for use. Each mix design shall show the ingredients of the mix and shall include:

1. Type, brand, source, and amounts of cement, pozzolans, admixtures, and other additives.

2. Source and amount of water.

3. Combined grading of each mix design.

4. Specific gravity of all materials.

5. Results of all required tests.

6. A certificate of compliance signed by the supplier

7. Water: Use potable water. Verify with foaming agent supplier that water supplied contains no substance deleterious to the foaming agent.

8. Concrete Admixtures: Material specifications and instructions for use.

9. Air content, unit weight, and compressive strength test results for proposed mix design.

D. Equipment: Manufacturer's specifications and operation instructions for equipment.

1. Pumps.

E. Work Plan: The work plan for placing the concrete, including sequence of work, types of equipment, location of equipment, placing procedures, (i.e., batching, mixing, and pumping procedures), pumpline arrangement (including moving and breaking), intermediate and end bulkhead details, communications provisions, methods for monitoring mix, testing procedures, and cleanup procedures. The work plan shall include pumping pressures, pumping rates, volumes to be placed per day, injection locations, sequence of placement and pumping, and procedures for verifying the annular space is completely backfilled.

F. Test Reports and Certifications

1. Mill test reports for cement.

2. Certificates of compliance for each load of cement and pozzolan.

3. Certificates of compliance for all admixtures.

4. A delivery ticket with the information stated in section 14 of ASTM C94, except for actual scale weights of materials, shall be furnished to the Engineer with each batch of concrete before unloading at the site.

5. A printout of the actual scale weights for all loads batched shall be submitted to the Engineer at the end of each working day.

6. Daily reports and records of concrete placement, including but not limited to volumes placed, stationing of placement, injection locations, pressures, unit weight and air content testing results, time of placement, and designation of cylinder samples prepared that day.

7. Test reports indicating the results of compressive strength tests from a certified testing laboratory.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Concrete Fill: Class 40P as specified in Section 03 30 00 – Cast-in-Place Concrete.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Temporary steel construction tracks may be left in place if they do not interfere with alignment and blocking of the carrier pipe, or interfere with final placement of the tunnel backfill, as approved by the Engineer.

B. Concrete shall be placed in lifts with a maximum height of 2 feet.

C. As a final stage of backfilling the tunnel, pressure grout along the tunnel's full length at its ceiling. Use a balanced cement grout with minimum 28-day compressive strength of 3,000 psi. Include details of the grout, grouting

equipment, and procedures in the Work Plan submittal required by Paragraph 1.07.E.

3.03 FIELD TESTING / QUALITY CONTROL

A. As required by Section 03 30 00 – Cast-in-Place Concrete.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 32 90 00 - PLANTING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Planting as specified herein includes, but is not limited to, the following:

1. Furnishing and installing new trees, shrubs, grasses, and all other plant materials.
2. Furnishing and installing new seeded or hydro-seeded areas.
3. Staking and guying of trees, only where shown on the Contract Drawings or as directed.
4. Furnishing and installing filter fabric and drainage gravel under planted areas, in areas as shown on the Contract Drawings.
5. Furnishing and installing mulch.
6. Protection and maintenance of all plant materials and the replacement of plantings as required until Substantial Completion.
7. Plant protection, maintenance and replacements during guarantee period.

B. The Contractor shall implement practices and procedures to meet the Project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

C. The following index of this Section is presented for convenience:

D.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	9
2.04	Source Quality Control / Shop Tests	9
PART 3	EXECUTION	9
3.01	Examination / Preparation	9
3.02	Installation	11

3.03 Field Testing / Quality Control 12
3.04 Startup / Demonstration 14
3.05 Adjusting / Protection / Cleanup.....16

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 23 23 - Fill

B. Section 31 25 10 - Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. AmericanHort

1. American Standard for Nursery Stock (ASNS), ANSI Z60.1, current edition

B. New York Flora Atlas (http://newyork.plantatlas.usf.edu/Default.aspx)

C. USDA Plant Database (http://plants.usda.gov/java/) & USDA Plant Hardiness Zone Map (http://planthardiness.ars.usda.gov/PHZMWeb/)

1.05 DESCRIPTION

A. Contractor shall locate all required plant materials and be present for their inspection, as directed by the Engineer, at the nursery prior to transport or upon delivery of the materials on Site. Notify the Engineer at least 14 days in advance of the Contractor's desired inspection dates and locations. The Engineer may designate a DEP Bureau of Water Supply Restoration Specialist as the Engineer's representative.

B. Inspection at Nursery: All plants may be inspected and selected by the Engineer at the nursery for conformity to the requirements of the Contract. Whether plant materials are inspected or not at the nursery, the Contractor shall make all preselection arrangements required by the Engineer to ensure an efficient selection procedure. Approval of plant materials at the nursery shall not affect the rights to inspect or reject the materials upon delivery or later.

C. Inspection at Delivery On-Site: Notify the Engineer at least five (5) working days in advance of delivery of plants to the Site.

1. The Engineer will inspect all plants upon delivery to the Site.

2. Contractor shall schedule a time for on-site inspection prior to planting, and shall arrange for adequate labor and equipment on-site at the time of inspection to unload, open, and handle plants during inspection.

3. The Engineer may reject any plant material prior to or upon delivery to the Site.

   a. All plant material that is dead, dying or appears unhealthy will be rejected.

   b. All plant material that has been improperly maintained, dug, transported or handled in such a way as to impair its appearance or health will be rejected.

   c. All substitutions are subject to approval by the City.

D. The Engineer will be the sole judge of the condition of the plants.

1. All material that is rejected on site shall be removed immediately from the Site and replaced with new material selected or approved by the Engineer, at no additional cost to the City.

E. Sustainable Design Requirements:

1. Regional Materials: Provide plant materials that were grown and harvested, or extracted, within 250 miles of the Site unless otherwise required in the Contract.

F. Project-specific requirements will be provided in the Contract, if necessary, to supplement requirements given herein or on the Contract Drawings

1.06 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary for work to comply with such requirements at no additional cost to City.

B. Procure and pay for permits and licenses required for Work of this Section. Obtain all required permits in a timely manner to avoid delays to the Work.

C. Plant Quality

1. Provide plant material to meet or exceed applicable standards defined by American Standard for Nursery Stock (ANSI Z60.1, latest edition). including plant names, size and grading standards.

   a. Plants shall be typical of their species or variety with normal habits of growth, in accordance with ANSI Z60.1; sound, healthy and vigorous, well-branched and densely foliated when in leaf, with healthy well developed root systems; and free from disease, abrasions of the bark, insect pests, eggs or larvae.

   b. Plant species native to the Eastern United States shall be provided. Non-native species shall not be considered as substitutes for native species.

c. Plants shall be true to species and, if as a variety or cultivar, said cultivar or variety shall be listed in The New York Flora Atlas (http://newyork.plantatlas.usf.edu/Default.aspx) to determine nativity.

d. Native plant material shall be derived from the local genotypes of the native plants specified to the greatest extent practicable. No plant material shall be collected or harvested from non-nursery areas.

e. Plants that have escaped cultivation, or have accidentally been introduced or naturalized into native habitats, shall not be considered native to the Eastern United States. Refer to USDA Plants Database (http://plants.usda.gov/java) for taxonomy and New York Flora Atlas to determine nativity.

D. Landscape Subcontractor

1. The Contractor shall provide evidence to the Engineer that the landscape subcontractor has experience in landscape work similar to the type and scale of work to be provided in this Project.

1.07 SUBMITTALS

A. Submit a Statement of Qualifications for the landscape subcontractor, that shall consist of the following information:

1. Company name and address
2. Number of years in business under this name
3. Number of current full-time, part-time, and seasonal employees
4. Estimated number of employees intended for this Project
5. Current workload:
   a. Name and address of current projects
   b. Types and dollar amounts of work for which landscape subcontractor is responsible in each current project
   c. Estimated completion date for each current project
6. References for three (3) projects completed within the last six (6) years, which are similar in scope to this Project, including the following information for each project:
   a. Name and address of project
   b. General description of work
   c. Dollar amount of landscape work performed
   d. Dates landscape work was started and completed

e. Verified contact information for at least one (1) representative of the owner or prime construction contractors in each projects:

1) Name,

2) Mailing address,

3) E-mail address, and

4) Telephone numbers (Office and Direct).

7. Contact information similar to above for at least one (1) representative of the Architect, Engineer, Landscape Architect, or other representative of the designer or construction manager for each project given as reference.

B. Samples: Submit samples of the following items:

1. Mulch: One (1) pound bag with manufacturer's certification of content

C. Growers/Nurseries: Contractor shall submit a list of proposed growers/nurseries prior to the commencement of any landscaping Work, with sufficient advance notice of at least 60 days or as stated in the Contract.

D. For nurseries, a copy of state inspection certificate for current year shall be submitted.

E. Materials/Certificates: Contractor shall submit a list of all materials and certificates specified in this Section prior to the commencement of any landscaping Work, with sufficient advance notice of at least 30 days or as stated in the Contract.

F. All necessary state, federal and other inspection certificates as may be required by law.

G. Product Data - Where applicable, the following product data shall be submitted:

1. Manufacturers' product information for filter fabric, showing conformance with the specified requirements.

2. Analysis of each seed or hydroseed mix to be used, showing percentage of each species, percentage of purity, weed content and germination of seed.

3. Certified analysis for each treatment, amendment, and fertilizer material specified and as used, including weight for packaged material.

4. Manufacturers' product information for erosion control blankets or mats, including documentation that products are 100% biodegradable.

H. Documentation: The Contractor shall submit written documentation at least 30 days prior to scheduled start of planting that all plant material has been ordered.

I. Maintenance Program: Submit written schedule of maintenance operations proposed for the guarantee period. Schedule shall be in the form of a list of all proposed maintenance tasks, with dates showing when each maintenance task will be performed and its frequency of occurrence.

J. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Regional Materials. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

K. Indicate the location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. For assemblies, include the percentage by weight that is considered regional.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in unopened bags or containers, each clearly bearing the name of the producer, the material composition, manufacturers' certified analysis, and the weight of the material.

B. Handle all plant material to prevent injury to trunks, branches and roots.

1. Do not bend or bind-tie trees in such manner as to damage bark, break branches or destroy natural shape.

2. Do not drop or thrown plant material during delivery. Unloading shall be performed with appropriate equipment.

C. Pack and ship all plant material to ensure arrival at site in good condition. Provide protective covering during transport and delivery.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. All new plant material shall be guaranteed for a period of 2 years after the date of Substantial Completion, unless otherwise required in the Contract.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable suppliers of planting materials shall be as indicated below.

1. Hardscrabble Farms Nursery, North Salem, NY (www.hardscrabblefarms.com);

2. Pinelands Nursery, Columbus, NJ (www.pinelandsnursery.com);

3. New England Wetland Plants, Inc., Amherst, MA (www.newp.com);

4. One Nature Nursery, Bloomingburg, NY (www.onenaturellc.com);

5. Ernst Conservation Seed, Meadville, PA (www.ernstseed.com);

6. Sylva Native Nursery & Seed Company, Glen Rock, PA (www.sylvanative.com);

7. Octoraro Native Plant Nursery, Kirkwood, PA (www.octoraro.com);

8. Northcreek Nurseries, Oxford, PA (http://www.northcreeknurseries.com);

9. Or approved equal.

B. All nurseries supplying plant material shall have a registration certificate from the Department of Agriculture and Markets, Division of Plant Industry, New York (or similar organization in the state from which plant material is obtained) certifying that the plant material is apparently free of injurious insects, diseases and invasive plant material.

2.02 MATERIALS / EQUIPMENT

A. Mulch

1. Mulch shall be a double-shredded natural forest product of a uniform grade, partially decomposed, undyed, free from sawdust, with no additives or any other treatment. Size of bark shall be from 5/8 inch to one and 1/4 inch.

2. Mulch sources shall be free of weed seeds, diseases or pest infestations including but not limited to the Emerald Ash Borer, Asian Longhorned Beetle and Spotted Lanternfly. Use of material from any areas that have been designated for quarantine of wood products by any state or federal agency is strictly prohibited.

B. Grass Seed for Lawn Areas

1. Grass seed for lawn areas shall be fresh re-cleaned seed of the latest crop. Unless otherwise specified in the Plans or Contract, seed mixture shall have the following proportions by weight:

a. 60% Kentucky Blue-grass

b. 20% Fine Fescue

c. 20% Perennial Ryegrass

2. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

3. Grass seed for lawn areas shall be provided only for areas where lawn is specified. It shall not be furnished for temporary stabilization prior to final Site restoration in restoration projects.

C. Grass Seed for Hydroseeded Areas

1. Grass seed mix for hydro-seeding shall be fresh re-cleaned seed of the latest crop. Seed mixture shall have the following proportions by weight:

a. 40% Creeping Red Fescue

b. 30% Perennial Ryegrass

c. 20% Annual Ryegrass

d. 10% Kentucky bluegrass

2. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

3. Grass seed for hydro-seeding shall be provided only for areas where hydro-seeded turf-grass is specified. It shall not be furnished for temporary stabilization prior to final Site restoration in restoration projects.

D. Native Wildflower Meadow Seed Mix

1. Seed for native grass and wildflower seeded areas shall be fresh recleaned seed of the latest crop.

2. Plantings shall be as specified in Table 32 90 00–1. No replacements or substitutions may be made without prior City approval.

Table 32 90 00–1
Seed Schedule (seeding rate: 30 lbs/acre)

BOTANICAL NAME	COMMON NAME	PERCENTAGE
ANDROPOGON GERARDII	BIG BLUESTEM	10
ASCLEPIAS TUBEROSA	BUTTERFLY WEED	5
BAPTISIA TINCTORIA	WILD INDIGO	3
HELIOPSIS HELIANTHOIDES	OX EYE SUNFLOWER	5
HYPERICUM PUNCTATUM	ST JOHNS WORT	3
MONARDA FISTULOSA	WILD BERGAMOT	3
PANICUM VIRGATUM	SWITCH GRASS	10
PENSTEMON HIRSUTUS	BEARD TONGUE	5
RUDBECKIA HIRTA	BLACK-EYED SUSAN	5
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	20
SENNA HEBECARPA	WILD SENNA	3
SOLIDAGO RUGOSA	ROUGH STEMMED GOLDENROD	3
SORGHASTRUM NUTANS	INDIAN GRASS	15
SYMPHYOTRICHUM SAGITTIFOLIUM	ARROW-LEAF ASTER	5
ZIZIA AUREA	GOLDEN ALEXANDERS	5

NOTE: 2-INCH PLUGS 3-FT O.C. REQUIRED FOR ALL NATIVE WILDFLOWER MEADOW SEED MIX AREAS

3. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

E. Filter Fabric

1. Filter fabric shall be non-woven type conforming to the requirements of Section 31 25 10 - Dust, Soil Erosion and Sediment Control.

F. Water

1. The Contractor shall supply all required water to the Site at no additional cost to the City. In projects outside New York City, the Engineer will coordinate with the Contractor to locate a source of water.

a. The Contractor shall correct all Work injured or damaged because of the lack of water, or the use of too much water, or the use of contaminated water.

b. Water shall be free from impurities injurious to vegetation.

G. Erosion Control Mats

1. Erosion control blankets or mats shall be 100% biodegradable and free of any plastic.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. Approximately one (1) month prior to the expiration of the guarantee period, the Contractor shall arrange a site inspection by the Engineer.

2. At this time, the Engineer will prepare a list of all remedial Work required, including plant replacement and maintenance.

3. This Work shall be carried out before the end of the guarantee period, unless weather conditions cause delays, in which case such Work shall be carried out as soon as is practical, as determined by DEP.

4. The Contractor shall coordinate its Work with that of other Contractors. Such coordination shall include, but not be limited to:

a. Location of all underground utility lines and structures

b. Scheduling of planting operations

c. Scheduling of maintenance operations

5. The Contractor shall be liable for all damage to surrounding areas caused by planting operations and shall be required to restore or replace the damaged areas to their original condition.

6. Contractor is responsible for determining the location of all utilities, by contacting the appropriate utility company prior to any planting activities.
    a. Verify that underground utilities and irrigation systems in landscape areas are in place, at the proper location, tested (except final irrigation testing) and ready for use.
        1) Take proper precautions so as not to disturb or damage sub-surface elements.
    b. Coordinate with other trades.
7. The Contractor is liable for any damage to such utilities during the course of construction, and is responsible for making necessary repairs to damaged utilities at its own expense.

B. Preparation

1. Planting
    a. Install filter fabric under planted areas, in areas shown on the Drawings.
        1) Fabric shall be overlapped by a minimum of six (6) inches.
        2) Fabric shall be held in place with wire staples of adequate quantities to prevent movement of fabric during planting operations.
        3) Fabric ends shall be secured in trenches as shown on the Drawings.
        4) No fabric shall be visible following completion of planting and seeding operations.
    b. Exercise extreme caution during excavation to avoid damaging or interrupting existing underground utilities. Use appropriate detection equipment to locate utilities during excavation for planting.
    c. Erect barricades, warning signs, or other protective devices as may be required by local, state, or federal laws and regulations to protect open excavations.
2. Seeding
    a. All areas to be seeded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots or other objectionable material shall be removed.
    b. Provide 4 inches of planting mix, spread evenly over all areas to be seeded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling.

c. After all materials have been worked in, firm up soil by rolling to eliminate all soft spots. Rake entire area into a crumbly state, with one inch of loose soil at the surface, using a wide-toothed rake or tine-harrow.

3.02 INSTALLATION

A. Plant only within the following dates, weather permitting. Do not plant in times of high wind, rain, sleet, or snow when the ground is frozen or excessively wet; or when the soil is otherwise in an unsatisfactory condition for planting. Planting at times other than those specified will be at the Contractor's own risk, and will not invalidate any guarantees.

1. Seeding or hydroseeding shall be carried out during the following dates:

a. Spring: April 1 to June 15

b. Fall: September 1 to October 15

2. Seeding shall be in moderately dry to moist soil, at such times when wind does not exceed five (5) miles per hour.

B. Do not plant until plant material has been approved by the Resident Engineer at the Site.

C. If planting is delayed more than 6 hours after delivery, provide adequate means of protection from freezing and from the drying effects of wind and sun.

1. Protect root balls with soil, wet mulch, or other acceptable material.

2. Provide shade structures or other covering as required to protect from sunscald.

3. Water as necessary until planted. Do not allow plant material to wilt or show signs of stress from lack of water. Provide all water and equipment for water distribution at no additional cost to the City.

4. Do not remove container-grown stock from containers prior to planting.

D. Placement of Plants

1. Plants shall be set in the center of pits, plumb and straight, in accordance with the planting details, and faced to give best appearance and relationship to adjacent plants and structures.

2. Plant to such depth that the finished grade level of plant, after settlement, will be the same as that at which the plant was grown.

3. Trees must be planted at the depth of the flare, where roots spread from the trunk. The flare must be located and placed at the correct level before continuing planting operations.

E. Watering

1. Immediately after installation of each plant, the soil around it shall be thoroughly saturated with water.
    a. Apply water slowly so as to penetrate the entire root system.
    b. Watering shall continue throughout the maintenance and guarantee period, as frequently as seasonal conditions require, until Final Acceptance of the Work.
    c. Contractor shall be responsible for adequate water both before and after installation of irrigation system.

F. Mulching

1. After planting operations are complete all plant bed areas shall be covered with approved mulch.
    a. Unless otherwise specified on the Contract Drawings, mulch shall be installed at an even depth of three (3) inches over tree pit and shrub areas and two (2) inches over groundcover beds.
    b. Mulch shall be contained within the plant bed areas and shall not be permitted to spread onto paved areas. Mulch shall not cover plants.
    c. Mulch shall not be placed in direct contact with tree trunks. The area of the root flare shall be left free of mulch.

G. Antidesiccant Spraying

1. Use antidesiccant only as approved by Engineer. Approval is required for each condition of use.

3.03 FIELD TESTING / QUALITY CONTROL

A. Protection and Maintenance

1. At least 30 days prior to the date of the written request for Substantial Completion, the Contractor shall submit a written protection and maintenance program and schedule to the Engineer for approval.
2. Protection and Maintenance program shall be revised and resubmitted as required until approved by Engineer.
3. During the guarantee period, the Contractor shall maintain all plant materials as specified herein, and as noted in the approved maintenance schedule, and shall replace, at no additional cost to the City, any and all plant material that has died or, in the opinion of the Engineer or Engineer's designated representative, is in unhealthy or unsightly condition.
4. The Contractor is responsible for providing and maintaining adequate protection measures for all planted areas throughout the guarantee period

in order to protect plantings from any subsequent construction operations or other types of physical damage.

a. Protection measures may include, but not be limited to, approved temporary fencing, tree guards, signage and other measures as determined to be necessary during the guarantee period.

b. Local fence ordinances and guidelines may also apply to the work, requiring the Contractor to submit design drawings or other documents for obtaining the necessary local permits or approvals at no additional cost to the City.

B. Replacements

1. There will be no limit to the number of times replacements are made of individual plants, unless conditions causing the failure can be proved to be beyond the control of the Contractor.

2. The Contractor is responsible for replacing any and all plant material and any associated compacted soils that are damaged by the Contractor's own operations or the operations of any of its subcontractors, or due to other damage resulting from a lack of adequate protective measures, at no additional cost to the City.

3. All replacements shall be in accordance with original specification or, if it is determined that specified plants are inappropriate for as-built conditions, they may be replaced with the approval of Engineer to more appropriate species as identified by a DEP Restoration Specialist, Landscape Architect or other qualified professional.

4. Cost of all replacements shall be included in the Contract price. No additional payment will be made therefor.

5. Replace unacceptable plant material no later than the next succeeding planting season.

6. Guarantee all replaced material for a period of 18 months after the date of replacement, unless otherwise required in the Contract.

7. All areas damaged or soiled by replacement planting operations are to be fully restored to their original condition at no additional cost to the City.

C. Substantial Completion

1. Contractor shall submit a written request to the Engineer, for a formal inspection of the planting Work for Substantial Completion.

2. To be accepted at the time of formal inspection of planting Work, all plant material must be alive, healthy, and installed as specified.

a. If plants are dead, dying, or unhealthy, or if landscaping does not serve its visual or soil stabilization functions, or if workmanship is unacceptable to the Engineer or Engineer's Representative for

other reasons, written notice will be given to the Contractor in the form of a punch list that itemizes all remedial Work required for Substantial Completion.

b. This Work may include plant replacement or maintenance which must be carried out prior to issuance of the Certificate of Substantial Completion.

c. The Certificate of Substantial Completion will not be issued until a written maintenance program, as described herein, has been approved by the Engineer.

D. Final Acceptance

1. Following the completion of all remedial work and replacement plantings, the Contractor shall request the Engineer in writing for a formal inspection of the landscape Work for Final Acceptance.

2. If replacement plantings are required, Final Acceptance may only take place upon a final inspection at the end of the guarantee period for the plant replacements.

E. All of the materials and labor required for plant protection, maintenance and replacements during the guarantee period shall be included in the Contractor's bid price. No additional payments will be made therefor.

3.04 STARTUP / DEMONSTRATION

A. Seeding Operations

1. Prepare seedbeds in undisturbed areas by lightly tilling or harrowing to a depth of two (2) inches. No fertilizer is to be applied to wildflower or native grass areas. Prior to preparation of undisturbed sites, remove existing grass, vegetation and turf. Contractor shall take particular care so as not to damage existing plant material adjacent to seeding area while preparing seed bed. Dispose of removed vegetation off-site in accordance with all local laws; do not turn over into soil being prepared for native grass and wildflower seeding.

2. Moisten prepared seeding areas before planting if soil is dry. Do not create a muddy soil condition.

3. Apply seed with drop or cyclone spreader to uniformly cover seedbed at the manufacturer’s suggested rate. In general, spring and summer seeding will be at a rate of 30 lbs./acre and winter seeding at a rate of 100 lbs./acre, per NYSDEC guidelines.

4. Small wildflower seeds should be mixed with damp sand and hand sown. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over the entire area.

5. Lightly rake seed into soil, and cover entire area with salt hay or straw, to a thickness of one (1) inch. For larger areas, a mechanical power drawn seeder or combination grass planter and land packer or pulverizer may be used. Seed to be planted not deeper than 1/4 inch. Seeding operations shall be kept as close as possible to the contours and not up and down the slopes.

6. Quick growing cover annual crop should be applied at the manufacturer suggested rate.

7. Water all seeded areas immediately upon installation, taking care not to wash out the seeds, and regularly during first four (4) weeks following seeding to maintain adequate moisture for deep root growth.

8. Seeding shall not be done on frozen ground or when the temperature is 32º F or lower. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

9. Seeded areas shall be protected during establishment.

B. Hydroseeding

1. All areas to be hydroseeded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots, or other objectionable material shall be removed.

2. Provide six (6) inches of soil mix and spread evenly over all areas to be hydroseeded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling.

3. Apply hydroseeding solution with a mobile tank with a centrifugal pump, using a seeding nozzle of a design to produce an even distribution of the solution

4. Clean and remove all hydroseeding solution from areas outside of the limits of hydroseeding, including removal from structures, walls, paving, trees and other plant material.

C. Watering of Seeded and Hydroseeded Areas

1. The Contractor shall provide all labor and arrange for all watering necessary to establish acceptable stands of planting in seeded areas. .

   a. Begin watering immediately following installation.

   b. Watering shall continue throughout the Contract period until Substantial Completion.

   c. During the first two (2) weeks after planting, in the absence of adequate rainfall, watering shall be performed up to three (3) times daily or as often as necessary and in sufficient quantities to maintain moist soil to a depth of at least two (2) inches.

d. After the first two weeks, the Contractor shall water the seeded areas to maintain adequate moisture in the upper two (2) inches of soil, necessary for the promotion of deep root growth.

2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply one (1) complete coverage to the lawn areas in an eight (8) hour period.

D. Reseeding

1. Any areas that fail to show growth within three (3) weeks of seeding shall be immediately reseeded at no additional cost to the City.

2. Reseeding shall be carried out as many times as necessary until a uniform grass cover is established.

3. Scattered bare spots, none of which are larger than one square foot, will be allowed up to a maximum of 3 percent of any seeded or hydroseeded area.

E. Mowing

1. Mowing of all seeded or hydroseeded lawn areas shall begin when grasses and other plants are firmly rooted and secure, and shall continue until Substantial Completion.

2. Mow all grass lawn areas to maintain the grass height between 1-1/2 and 2-1/2 inches and meadow areas up to six (6) inches or as directed by the DEP Maintenance Supervisor.

3. Wildflower and native grass seeded areas shall be mown no more than two (2) times per year.

a. First mowing shall be carried out after seed set and shall not be carried out earlier than September 15 nor later than November 15. Mow to a height of not more than 9 inches.

b. Second mowing shall be carried out four (4) to six (6) weeks after first mowing, unless otherwise directed by DEP. Mow to a height of between 5 and 6 inches

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting

1. Maintenance of all plant material shall begin immediately after planting, and continue until the end of the guarantee period, unless otherwise noted.

2. Defective Work shall be corrected as soon as possible after it becomes apparent and when weather season permits. The Engineer shall be the sole judge of the condition of the plants.

3. Maintenance shall include:

a. Watering, replanting, reseeding, repair of ruts and erosion, repair of protection devices, weeding and continuous control of invasive species, fertilizing and mowing of lawn areas.

b. The removal of all dead, dying or unhealthy plant material, including lawns, and replacement of such material with new plants or seeding to meet all specifications of the original plantings.

c. Protection from insects, disease, and invasive species to maintain optimum health. Infection or infestation may require removal and disposal off-site followed by replacement with plants free of infection at the discretion of the Engineer's designated representative.

d. The repeating of any or all phases of planting or lawn work as specified herein, or that may be required to obtain healthy plantings and a uniform, thick, and well developed stand of grass.

4. Specific Maintenance Tasks: Maintenance shall include, but not be limited to the following:

5. Watering: Water lawns and planted areas as required. Do not permit plant material to wilt or to show signs of stress from lack of water. Contractor shall supply and distribute water to all lawns and plantings during the full time of their establishment at the Site and provide all equipment for water distribution at no additional cost to the City. Plants and lawns shall be inspected by the Contractor for watering needs at least once each week, and watered as necessary to promote plant growth and vitality.

6. Mowing: As described hereinbefore.

7. Fertilizers: If applicable, apply any approved fertilizers, herbicides, pesticides or fungicides as required, or as directed by the Engineer, to keep all plantings healthy and pest-free throughout the guarantee period. Any fertilizers, herbicides or pesticides must be approved in advance by DEP.

8. Rodents: Protect against and exterminate rodents, and repair of any damage caused by rodent activities.

9. Weeding: Weed to keep all planted areas weed-free throughout the guarantee period.

10. Mulching: Add mulch material as required to maintain mulch at specified depth.

11. Resetting: Reset plant material that has settled, to proper grade and position.

12. Trimming: Cut back dead stalks, flowers and foliage from perennials in fall after the first frost. Trim or dead-head spent flower blossoms throughout the guarantee period.

13. Irrigation: If applicable, coordinate with irrigation system installer for all adjustments to irrigation as required.

14. Instruct City's maintenance personnel in all maintenance procedures.

15. Maintenance Program

    a. Prior to Substantial Completion, the Contractor shall arrange a meeting with the Engineer and with the City's designated maintenance personnel to review together the submitted maintenance program and any modifications required for the duration of the guarantee period.

    b. The Contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program.

    c. Any recommended changes shall be submitted in writing to the Engineer.

    d. Additional remedial work not included in the maintenance program shall be carried out by the Contractor as deficiencies are identified and reported by the Engineer or designated maintenance personnel.

16. Replacements

    a. In accordance with the requirements for Warranty (Guarantee Period) under this Section, the Contractor shall replace, as soon as weather conditions permit, and within a specified planting period, all plants determined dead and/or dying by the Engineer or the City's designated personnel during and at the end of the guarantee period. Replacements shall be made at no additional cost to the City. Labor and all materials needed for installation of replacements shall be included in the warranty.

    b. Plants shall be free of dead or dying branches and shall bear foliage of normal density, size, and color.

    c. Trees having lost their central leader or exhibit crown dieback at the end of the guarantee shall be replaced.

    d. Replacements shall match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Section.

B. Plant Protection

1. The Contractor shall provide at its own expense all protection that is deemed necessary for all plants and lawn areas against damage prior to Final Acceptance.

2. Removal of Temporary Protection Measures: All temporary protection measures employed during the construction period shall be removed prior

to Substantial Completion unless otherwise directed by the Engineer. All stakes and ties used for temporary bracing of trees shall be removed and disposed of by the Contractor off site at its own expense at the end of the guarantee period, or earlier at the direction of the Engineer.

C. Clean Up

1. At the end of each work day the Contractor shall broom-clean the site, to remove all trash, debris, and loose soil materials. Store materials and equipment where directed.

2. Immediately following the completion of planting operations, the Contractor shall remove all excess materials, stockpiles, waste materials, tools, and equipment, and leave the Site in a clear and clean condition.

3. Immediately remove all rejected materials from the Site. All rejected materials and other waste or debris shall become the property of the Contractor, who shall legally dispose of same off-site.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 05 – EXPOSED PIPING INSTALLATION
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to install all exposed piping complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	3
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	8
1.09	Spare Parts, Special Tools, and Supplies	8
1.10	Warranty	8
PART 2	PRODUCTS	8
2.01	Manufacturers	8
2.02	Materials / Equipment	8
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	9
3.03	Field Testing / Quality Control	30
3.04	Startup / Demonstration	30
3.05	Adjusting / Protection / Cleanup	31

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 05 12 00 – Structural Steel Framing.

C. Section 40 05 05.30 – Leakage Testing for Exposed Piping.

D. Section 40 05 06 – Couplings, Adapters, and Specials for Process Piping.

E. Section 40 05 07 – Hangers and Supports for Process Piping.

F. Section 40 05 53 – Process Valves 24-inch Diameter and Larger.

G. Section 40 05 97 – Identification for Process Equipment.

H. Section 40 06 01 – Schedule for Exposed Piping.

I. .

1.04 REFERENCES

A. Definitions:

1.	Buried Piping:	Includes all piping beginning at the outside face of a structures or foundation and extending away from structures. Buried piping includes piping beneath structures or foundations.
2.	Exposed Piping:	Includes all piping beginning at the outside face of a structures or foundation and extending inside. Exposed piping includes interior piping. Exposed piping also includes all piping embedded in concrete, as well as all piping that is permanently or intermittently submerged and/or installed in a subaqueous environment.

B. Reference Standards:

1.	ANSI/SMACNA	Seismic Restraint Manual.
2.	ASME	Boiler and Pressure Vessel Code.
3.	ASME B1.1	Unified Inch Screw Threads.
4.	ASME B31.1	Power Piping.
5.	ASME B31.3	Process Piping.
6.	ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
7.	ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
8.	ASTM B32	Standard Specification for Solder Metal
9.	ASTM D2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
10.	ASTM D2855	Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining PVC or CPVC Pipe and Piping Components with Tapered Sockets.

11.	ASTM F493	Standard Specification for Solvent Cements for CPVC Plastic Pipe and Fittings.
12.	ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of PVC Plastic Pipe and Fittings.
13.	AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
14.	AWWA C206	Field Welding of Steel Water Pipe.
15.	AWWA C600	Installation of Ductile-Iron Mains and Their Appurtenances.
16.	AWWA C606	Standard for Grooved and Shouldered Joints.
17.	AWWA M11	Steel Pipe: A Guide for Design and Installation,
18.	AWWA M23	PVC Pipe – Design and Installation.
19.	AWWA M41	Ductile-Iron Pipe and Fittings.
20.	DIPRA	Installation Guide for Ductile Iron Pipe.
21.	NSF61	Drinking Water System Components Health Effects.

1.05 DESCRIPTION

A. This scope of this Section includes the requirements for the installation of exposed piping, except where installation requirements for exposed piping are shown or specified elsewhere in the Contract Documents. In addition:

1. The scope of this Section includes requirements for:

   a. The jointing of exposed piping

   b. The installation of gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, and tie rods.

   c. Modifications and/or adjustments to existing exposed piping.

   d. The installation of supports, restraints, and other anchors.

   e. The cleaning, disinfecting, and field testing of all exposed piping.

2. The extent of exposed process piping is shown on the Contract Drawings. The Contractor shall provide additional exposed pipe as necessary and/or required to complete the Work as shown and specified. Exposed pipe service, pipe diameter, coating, lining, pressure rating, joint type, and testing requirements are specified in the following section(s):

   a. Section 40 06 01 - Schedule for Exposed Piping.

3. Where shown on the Contract Drawings, the Contractor shall provide all labor and materials for making connections between exposed piping and

existing lines(s) installed under other contracts, including all specials required to connect exposed pipe to pipe of dissimilar material(s).

1.06 QUALITY ASSURANCE

A. Ductile Iron Pipe:

1. Refer to the latest edition of the DIPRA Installation Guide for Ductile Iron Pipe and the ductile iron piping manufacturer recommendations.

a. Where requirements from the manufacturer, requirements specified by the DIRPA Installation Guide, and requirements specified herein differ, apply the most stringent requirement of the three.

B. Steel Pipe:

1. Welding of steel pipe and fittings:

a. Welding procedures and welder qualifications shall conform to ASME Boiler and Pressure Vessel Code Section IX.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. Exposed piping submittals shall be submitted under the specification section number corresponding to the exposed piping material. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Shop Drawings:

1) Catalog cuts and data sheets, including but not limited to:

a) Specifications for all components of the exposed piping.

b) illustrations in sufficient detail to serve as a guide for assembly and disassembly

c) A parts schedule that identifies the materials to be used for the various piping components and accessories.

d) Weights of all component parts.

e) Details on joining methods.

f) Details of pipe lining, coating, wrapping, insulation and painting.

g) Copy of pipe coupling, special, and adapter details (pipe couplings, specials, and adapters shall be submitted for approval under Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping).

h) Copy of expansion joint details (expansion joints shall be submitted for approval under the specification section in which they are specified)

i) Copy of pipe hanger details (pipe hangers shall be submitted for approval under Section 40 05 07 - Hangers and Supports for Process Piping).

j) Copy of pipe insulation details (insulation shall be submitted for approval under Section 40 42 13 - Process Piping Insulation).

b. Layout and Installation Drawings:

1) Shall include plans, sections, and details showing location, elevations, and clearly marked dimensions.

2) Piece numbers which are coordinated with the tabulated pipe layout schedule shall be clearly marked.

3) The scale used shall be the greater of the following two (2):

a) The scale used on the Contract Drawings that depict the process pipe for which the submittal pertains, or

b) A minimum scale of ¼-in = 1-ft - 0-in.

4) When special designs or fittings are required, the work shall be shown in large detail and the special or fitting completely described and dimensioned.

5) Include a north arrow.

6) Information on pipe supports, including:

a) Pipe support location.

b) Pipe support type.

c) hanger rod size.

d) Insert type.

e) All loads on the support (in either lbs. or kips.)

7) Locations where pipe and valve identification signs will be placed.

8) Location of pipe couplings, specials, and adapters.

9) Location of expansion joints.

10) Locations of pipe hangers and supports.

11) Extent of pipe insulation and heat tracing.

12) Extent of lining, wrapping, and coatings.

c. A tabulated pipe layout schedule for each exposed process pipe system. Submit a separate schedule for each pipe system and/or service. The pipe layout schedule shall include the following information for each pipe section, fitting, and appurtenance that comprises that system:

1) Service.

2) Pipe size.

3) Working pressure.

4) Weight (in lbs.)

5) Joint type.

6) Wall thickness.

7) Piece number.

8) Laying length.

d. Calculations for the design of the support structures.

1) Design calculations shall be signed and sealed by a Professional Engineer registered in the State of New York.

2) Calculations shall include a summary of design criteria used in the design, including a description of each load case and load combination considered.

3) A tabulation shall be provided indicating vertical and horizontal deflections for the supports and individual members, determined for each load combination identified above.

4) A tabulation shall be provided giving the column vertical and horizontal reactions for each load combination.

e. For each exposed process piping system that contains expansion and swing joints, submit EMA calculations. Submit separate calculations for each pipe system and/or service.

f. For each exposed process piping system that contains valves, submit a tabulated valve schedule. Submit a separate schedule for each pipe system and/or service. The valve schedule shall include the following information for each valve:

1) Valve tag number.

2) Valve size.

3) Whether the valve is manual or actuated. If actuated, the type of actuator.

4) 100% open Cv value for control valves.

5) Upstream pressure (units of psig).

g. For steam piping, submit a trap schedule that includes:

1) Trap size.

2) Location and service.

3) Equipment tag number.

4) steam pressure (units of psig).

5) capacity required (units of lbs/h).

6) maximum capacity with safety factor.

7) Model number.

2. Information Submittals:

a. Certified Letters of Compliance:

1) Certificate of compliance with the requirements of the Contract Documents for pipe, fittings, couplings, sleeves, cleanouts and harnessing.

2) Certificate from an independent testing laboratory, approved by the City, for each welder assigned to the welding of pipe, fittings, and pipeline equipment.

3) Linings and Coatings:

a) Manufacturer shall submit a certificates or copies thereof attesting to the fact that the applicator met the requirements of the corresponding piping specification, adherence to all standards and testing specified therein, and that the material used was as specified therein.

4) Materials Certificates of Conformance: Submit certificates of conformance with Referenced Standards specified in the corresponding piping specification section.

b. Welding Procedures and Qualifications:

1) Certificates shall be of current issue and conform to the requirements of the applicable reference standards. In addition:

a) Certificates that all welders and welding operators have been qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX.

b) Certificates stating that the welding of steel and stainless steel shall conform to the requirements of ASME B31.1.

2) Copies of qualified procedures and list of names and identification symbols of qualified welders and welding operators, prior to welding operations.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Structural Attachments:

1. Structural steel brackets required to support piping and appurtenances but not shown on the Contract Drawings shall be provided under this section.

2. Material for structural attachments shall be as specified under Section 05 12 00 - Structural Steel Framing.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Identification:

1. Provide in accordance with Section 40 05 97 - Identification for Process Equipment.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All pipe coating injured in any way during transit or laying shall be satisfactorily repaired prior to placing the backfill.

1. Ample provision shall be made for the prompt and efficient repair of all abrasions and injuries.

B. Certificates of welding qualifications conforming to the requirements of ASME B31.1, Section 6 and its Supplements, shall be submitted to the Engineer for approval prior to proceeding with any pipe welding.

3.02 INSTALLATION

A. General:

1. All piping shall be erected to accurate lines and grades, permanently supported as shown, specified, or required.

2. Where temporary supports are used during construction, sufficient strength and rigidity shall be provided to prevent shifting or distortion of the pipe.

3. All work shall be accomplished using the best methods and procedures of recognized pipe fabrication in a good and workmanlike manner in accordance with the latest edition of the applicable standards referenced in the Contract Documents, including (but not limited to):

a. For ductile iron pipe:

1) AWWA C600.

2) AWWA M41.

b. For steel and stainless steel pipe:

1) ASME B31.3.

2) AWWA C206.

3) AWWA M11.

c. For thermoplastic pipe:

1) AWWA M23.

4. All exposed pipe, fittings, and appurtenances shall be installed in accordance with all of the following:

a. The manufacturer's printed instructions and recommendations.

b. The approved shop drawings.

c. As specified in the Contract Documents.

5. Routing:

a. Install piping in a neat manner with lines straight and parallel or at right angles to walls or column lines, unless otherwise shown on the Contract Drawings.

1) Install horizontal lines true to line and elevation.

2) Install vertical lines truly plumb in all directions.

b. Where practicable, install piping in groups and parallel to building walls.

c. Avoid installing piping through ductwork or directly under electric light outlets, or interfering with other pipe, lines, conduit, etc.

d. Leave all corridors, walkways, work areas, and similar spaces unobstructed.

e. Clearance:

1) Clearances shall be measured from the outermost edge of piping, flanges or other type of joint that extends beyond the nominal outside diameter of piping.

2) Provide a minimum clearance of 1-in. between pipe and other work.

3) Avoid installing pipe beyond furring lines as determined by the Architectural Drawings.

4) Provide a minimum headroom clearance under piping and pipe supports of 7.5 ft.

f. Small diameter piping and/or piping not shown on the Contract Drawings:

1) If specific locations and elevations are not shown on the Contract Drawings, install small diameter piping as specified herein, and as necessary and required to avoid ducts, equipment, beams, and other obstructions.

g. Multiple Pipe Runs:

1) In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member.

2) Spacing of the base support members shall not exceed the hanger and support spacing required for any individual pipe in the multiple pipe run.

6. Placing:

a. Install bell and spigot pipe so that bells face the direction of laying, unless otherwise shown on the Contract Drawings.

b. For coated pipe, care shall be exercised in laying and cradling the pipe to prevent injury to the coating.

7. Cuts:

a. Use cutting methods and machines specially designed for cutting the pipe material and approved by the manufacturer. The following cutting methods are not acceptable:

1) "Squeeze" type pipe cutters

2) Cutting torches

3) Diamond points

4) Dog chisels.

b. Pie Lengths:

1) Full standard lengths of pipe shall be used in each pipe run in so far as possible.

2) Shorter lengths than standard shall be used only to complete a straight run of pipe, to connect to established locations of valves, equipment, bends, and the like.

3) Random lengths of pipe or cuttings from standard lengths shall not be coupled together when a full standard pipe length will fit in the pipe run.

c. Pipe shall be cut square, and not upset, undersized, or out of round, except as follows:

1) Cut ends of push-on joint type pipe shall be tapered and sharp edges filed off smooth.

d. Ends shall be carefully reamed and cleaned before being installed.

e. Make cuts carefully without damage to coatings or linings.

8. Jointing:

a. Thoroughly clean all pipe, fittings, valves, specials, and accessories before jointing.

1) Remove all cuttings and foreign matter from inside of pipe and tubing.

2) Clean joining area of pipe, fittings, and appurtenances as necessary and required and as per manufacturer instructions.

a) For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.

b. Use jointing methods recommended and approved by the pipe manufacturer.

c. Unions:

1) Provide a union downstream of each valve with screwed connections.

2) Provide screwed or flanged unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.

d. Transitions from One Type of Pipe to Another:

1) Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

2) Connections between Dissimilar Metals:

a) Provide dielectric couplings, insulating couplings, unions, or other approved dielectric insulating devices, at all connections to pipelines or equipment of dissimilar metals, regardless of whether devices are shown on the Contract Drawings.

9. Bends and Turns:
   a. Do not spring or deform piping to make up joints.
   b. Bending of pipe is not permitted.
      1) Use fittings for all changes in direction.
   c. Bends shall be of 45° or 90° unless otherwise shown on the Contract Drawings.

10. Plugs:
   a. Shall match the materials, linings, and coatings of the process piping, and shall have a square head.

11. Transitions:
   a. Reducing fittings shall be used for all changes in pipe sizes, even when not specifically shown on the Contract Drawings.
      1) Unless otherwise shown or specified, use eccentric reducing fittings.
   b. Do not use bushings, except where specifically shown on the Contract Drawings.
   c. Nipples shorter than 4-in in length shall be Schedule 80.
   d. Between pressure ratings:
      1) Where lines of lower service rating tie into services, appurtenances, or equipment of higher service rating, the equipment, valve, or appurtenance between the two shall conform to the higher rating.

12. Drainage:
   a. The Contractor shall provide all pipelines with a means for drainage at all low points in the lines.
      1) Provide appurtenances for condensate drainage, regardless of whether such means is shown on the Contract Drawings and/or the approved shop drawings.
      2) Drainage from gas lines shall be provided through an approved, double-valved, manually operated condensate trap.
   b. Drainage valves and appurtenances shall be:

1) A minimum of 1-in. nominal diameter, unless otherwise shown on the Contract Drawings.

2) Adequately sized.

3) Of the same size as the drain pipeline specified herein.

c. Where drainage valves or appurtenances are located so that liquids can discharge and cause damage to a structure or equipment, the Contractor shall provide drain pipe to the nearest gutter or drain.

1) Provide a single drain pipe, matching the size of the drain valve and appurtenances, for each drain valve on the carrier pipe.

2) Unless otherwise shown on the Contract Drawings, the drain pipe shall be of Schedule 80 CPVC conforming to the requirements of Section 40 05 31, Thermoplastic Process Pipe and the installation requirements for thermoplastic piping specified herein.

3) A quick connect coupling shall be provided at the end of the drain line for attachment of a hose.

13. Venting:

a. The Contractor shall provide all pipelines for liquids with vents at all high points in the lines.

1) Provide vents regardless of whether vent valves are shown on the Contract Drawings and/or the approved shop drawings.

b. Vents shall consist of the following three (3) components:

1) An automatic air release/vacuum relief valve.

a) The valve shall have a cast or ductile-iron body and cover, stainless steel internals, and Viton or Buna N seal, unless otherwise specified.

2) An outlet vent line.

a) The outlet vent line from the valve shall be of Schedule 80 CPVC conforming to the requirements of Section 40 05 31, Thermoplastic Process Pipe and the installation requirements for thermoplastic piping specified herein.

b) Vent line shall terminate at a point approximately 3 ft above the floor.

3) An isolation ball valve:

a) A ball valve shall be provided between the carrier pipe and the automatic air/vacuum release valve to

allow removal of the automatic air/vacuum release valve for repair or replacement.

b) The body of the isolation valve shall be:

(1) For vents < 4-in.: Type 316 Stainless Steel.

(2) For vents ≥ 4-in.: The same material as the body of the automatic air/vacuum release valve.

c. Sizing:

1) For carrier pipelines ≤ 1-in.: Vents shall be the same size as the carrier pipe.

2) For carrier pipe > 1-in.: Vents shall be the size shown on the Contract Documents or 1-in., whichever is greater.

d. Vent valves (both the automatic air/vacuum release and isolation valve) shall meet the requirements of one (1) of the following Sections, depending on the size of the vent valve:

1) Section 40 05 53 - Process Valves 24--inch Diameter and Larger.

14. Drip Pans:

a. The Contractor shall provide drip pans under all pipelines installed over electrical equipment and motors and conduct drainage to the nearest floor drain, gutter, or other drainage system with ¾-in. red brass pipe conforming to the requirements of Section 40 05 15 - Copper and Brass Process Pipe, and installed as specified herein.

b. Make the connection between the drip pan and the brass drain pipe leak-tight.

c. Pitch the drip pan uniformly toward the drain pipe at a slope not less than ⅛-in. per lineal ft.

15. Insulation:

a. Refer to Section 40 06 01 - Schedule for Exposed Piping, and the Contract Drawings for the extent of insulated exposed piping.

b. Insulation shall be installed after the installation and testing of exposed piping.

16. Hangers and Supports:

a. Install pipelines with supporting devices in accordance with requirements of Section 40 05 07 - Hangers and Supports for Process Piping.

b. No piping shall be supported from metal stairs, ladders and walkways.

17. Restraints, Supports, and Thrust Blocks:

    a. Provide concrete and metal cradles, collars, kickers, and blocks as shown on the Contract Drawings.

18. Seismic Requirements:

    a. All piping and attached valves shall be supported and braced to resist seismic loads and in accordance with the SMACNA Seismic Restraint Manual.

19. Expansion and Contraction:

    a. The Contractor shall provide ample provisions for flexibility in all pipelines to compensate for expansion and contraction.

        1) Unless other forms of expansion compensation are shown or specified, the Contractor shall:

            a) Provide lengths of pipe shorter than the theoretical length to the extent of one half of the expansion, and install said lengths of pipe such that they may be free to expand without increasing the stresses imposed when cold.

        2) Otherwise, the Contractor shall install all piping with expansion devices to allow for proper expansion and contraction.

            a) Expansion devices shall allow the pipe to expand and contract freely without damage to any part of the piping system.

            b) Expansion devices shall include, but not be limited to: expansion joints, expansion couplings, swivel or swing joints or pipe bends, including such anchors as may be shown, specified, or required to make the devices effective.

    b. Cold sprung pipe:

        1) Install with metal filler pieces bolted between flanges or tack welded between weld joints.

        2) After the pipe, anchors, hangers and supports have been installed, the spacers shall be removed and the joint made.

    c. Swing Joints:

        1) For pipelines 2-in. nominal diameter or smaller, rated at working pressures up to 150 psig:

            a) Screwed end swing or swivel joints may be used.

            b) Otherwise expansion shall be taken up with nipples and fittings as required.

2) A sufficient number of fittings and pipe lengths in connection with swing joints shall be provided to assure the absence of distortion of either the pipelines or branches.

d. Branch Tees:

1) Install branch tees on risers in locations that will allow the branch lines, when expanded by heat, to drain properly.

e. Pipe Expansion Bends:

1) Pipe bends of approved design for compensating thermal expansion when shown, specified or required shall be fabricated and furnished as herein specified.

2) In pipelines operating under high pressures or high temperatures in which offsets occur in alignment that may be subject to bending stresses excessive for the fittings, or where otherwise deemed necessary, use appropriate pipe bends to make the offset.

3) Where possible, all bends shall have radii equal to a least six diameters ($r = 6 \times d$) of the pipe and tangents or straight lengths of the pipe shall be neatly made, true to radius, free from buckles and flat surfaces.

f. Application guide and anchor requirements for expansion joints shall be in accordance with the recommendations of the manufacturer or the Standards of the EJMA.

g. The Contractor shall adjust all expansion devices after installation (but prior to operation) so that the pipelines shall be fluid-tight through the full range of operating conditions.

20. Wall Sleeves:

a. Where piping passes through walls, partitions, floors, roofs, or structures, provide wall sleeves of wearing material to prevent abrasion damage to piping.

1) Pipe sleeves shall be Schedule 40.

2) Sleeves through walls shall be flush with wall face.

b. Anchor sleeves to concrete and masonry walls as shown on the Contract Drawings.

c. All annular spaces in exterior walls or walls subjected to hydrostatic pressure shall be completely watertight.

d. Do not install sleeves and pipes through structural members unless specifically shown on the Contract Drawings.

21. Temporary Blind Flanges, Plugs, Caps, and Bulkheads:

a. At the end of each day of work or other interruption of pipe installation, the Contractor shall provide temporary blind flanges, plugs, caps, or bulkheads as necessary and required.

1) Plug all bells at dead ends, tees, and crosses.

2) Cap all spigot and plain ends.

b. To perform the testing of exposed piping as specified herein, or as per the sequence of work specified in the Contract Documents, the Contractor shall provide temporary blind flanges, line stops, plugs, and bulkheads suitable for and capable of withstanding the services and pressures for which they are intended.

1) Refer to Section 40 06 01 - Schedule for Exposed Piping, for service and test pressures.

2) Temporary blind flanges, line stops, plugs, and bulkhead shall be compatible with and shall not damage the piping materials, coatings, and linings specified in Section 40 06 01 - Schedule for Exposed Piping.

c. The Contractor shall uninstall all temporary blind flanges, plugs, caps, and when they are no longer needed for the Work.

22. Flow Measuring Devices:

a. If not shown on the Contract Drawings, position flow measuring devices in pipe lines so that they have the amount of straight upstream and downstream runs recommended by the manufacturer, unless specific location dimensions are shown.

B. Ductile Iron Pipe:

1. Cutting:

a. Where field cutting of ductile iron pipe is permitted by the Engineer, ductile iron pipe shall be cut only by means of abrasive saws, hack saws, wheel type cutters or milling type cutters.

2. End Connections:

a. Mechanical Joint:

1) Ensure that cut ends are tapered and sharp edges are filed off smooth. Thoroughly clean the plain end (spigot) and the socket of the pipe or fitting.

2) Brush the socket, spigot end, gasket, and adjacent areas immediately before making joint with soapy water in accordance with AWWA C111.

3) Slip the gland and gasket over the spigot with the small side of the gasket facing the socket and the lip side of the gland facing the socket.

4) Insert the spigot into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.

5) Slide the gland towards the socket and center it around the pipe with the gland lip against the gasket.

6) Insert bolts and tighten nuts by hand.

7) With an ordinary ratchet wrench, tighten bolts evenly and alternately around. The pattern for tightening bolts shall be as per the manufacturer's recommendations. The bolt torque for mechanical joints shall be as per the DIPRA Installation Guide.

8) Do not deflect mechanical joint pipe after installation.

b. Push-On Joint:

1) Ensure that the spigot (plain) end is beveled as per the manufacturer’s recommendations and that sharp edges are filed off smooth.

a) Use a heavy file or grinder to bevel the plain end.

b) Do not use a saw blade to bevel the plain end.

2) Thoroughly clean the groove and the bell socket of the pipe or fitting. Also clean the plain end of the mating pipe or fitting.

3) Except for pipe lined or coated, use a wire brush to clean the exterior surface of the spigot and the interior surface of the bell.

a) Use a method for cleaning coated or lined portions of the pipe recommended by the coating or lining manufacturer.

4) Insert gasket into joint recess and smooth out entire circumference of gasket to remove bulges and to prevent interference with proper entry of spigot of entering pipe.

a) Use a rubber gasket recommended by the pipe manufacturer.

(1) Do not use gaskets that have been scored or otherwise damaged.

b) Wipe clean rubber gaskets and flex gaskets until resilient. follow the manufacturer instructions for gasket resiliency when assembling joints in cold weather.

c) As per the DIPRA Installation Guide, make at least one (1) small loop and then insert the gasket into the socket.

(1) For pipe sizes larger than 20-in. nominal diameter, it may be necessary to make two loops in the gasket opposite each other.

(2) Make sure the gasket faces the correct direction as per the manufacturer's instructions and that it is properly seated.

5) Apply lubricant as per the manufacturer recommendations to the surface of the gasket that will come in contact with the entering spigot. Also apply lubricant to the outside of the entering spigot.

(1) As per the DIPRA Installation Guide, do not apply lubricant to the bell socket or the surface of the gasket in contact with the bell socket.

6) Push the spigot end into the bell socket of the mating pipe or fitting, ensuring the joint remains straight.

a) Pause insertion when the spigot end just makes contact with the rubber gasket.

b) After the gasket is compressed and before the pipe is inserted completely, carefully check the gasket for proper position around the full circumference of joint.

c) Final assembly shall be made by inserting the spigot end of the entering pipe past the gasket until it makes contact with the base of the bell.

7) Deflect push-on joint pipe only after the joint is assembled and not exceeding the deflection shown on the Contract Drawings and the maximum deflection specified in the DIPRA Installation Guide for the nominal diameter of pipe in question.

c. Grooved / Shouldered End Joints:

1) Grooved and shouldered end joints and their installation shall conform to the requirements of AWWA C606.

2) Thoroughly clean the joint ends to remove foreign matter. Except for coated pipe, use a wire brush to clean the exterior surface of the joint ends.

a) Use a method for cleaning the coated portion of the pipe recommended by the coating manufacturer.

3) Remove the bolts from the coupling.

4) Apply lubricant to the rubber gasket or inside of the coupling housing and joint ends as per the manufacturer recommendations.

5) Position and install the gasket over the gap between the joint ends.

6) Install the coupling housing around the gasket and over the grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand.

7) Tighten the bolts uniformly and according to the manufacturer's instructions.

d. Flanged Connections:

1) All flange faces shall be in perfect alignment with the holes straddling the vertical center line of the piping.

2) Properly center the gasket. Use full-face gaskets for flat-face flanges.

3) Gaskets shall be suitable for the service conditions referenced in Section 40 06 01 - Schedule for Exposed Piping.

4) The gasket thickness shall be as recommended by the pipe manufacturer, with the exception that:

5) The minimum gasket thickness for raised face flanges shall be ⅛-in.

6) Bolts shall be of sufficient length so that when fully tightened, a minimum of two full threads shall extend beyond the nut.

7) Bolts shall be well lubricated over the entire thread length with a heavy graphite and oil mixture prior to the tightening operation.

8) Bolts shall be tightened with proper wrenches, care being taken to secure uniform pressure on the bolts and gasket and to avoid over stressing of the bolts, dishing of the flanges and compression of the gasket beyond its proper limits.

a) Commercial grade carbon steel bolts, ASTM A307, Grade B shall be tightened to obtain approximately 15,000 psi stress based on the root area of the thread.

b) Alloy steel bolts, ASTM A193, Grade B7 shall be tightened to obtain a stress of 45,000 psi.

c) The pattern for tightening bolts shall be as per the manufacturer's recommendations.

3. Support:

a. Provide supports for exposed ductile iron piping, fittings, appurtenances, and specials in accordance with the requirements of Section 40 05 07 - Hangers and Supports for Process Piping. In addition:

1) Where shown on the Contract Drawings, ductile iron pipe beneath the ground floors of buildings or structures shall be encased in concrete to form an integral part of the floor slab.

a) This piping shall be included in the definition of exposed piping.

b) The reinforcement in the floor slab shall be placed and bent so that the pipe encasement is an integral part of the concrete structure.

c) Concrete for encasement:

(1) Shall be class 40.

(2) Shall conform to the requirements of Section 03 30 00 - Cast-in-Place Concrete.

(3) Provide a 3-in. minimum depth of concrete between reinforcement and pipe or hanger components, and a 3-in. minimum depth covering on reinforcement.

C. Steel and Stainless Steel Pipe:

1. General:

a. Install in accordance with the best piping practice with a minimum exposure to the elements and to other corrosive conditions.

b. Before erection, all uncoated pipes shall be placed on end and hammered to remove scale and loose particles.

c. Pipe compounds:

1) For general service: Use an approved mastic metallic compound, Teflon tape, or approved equal shall be used.

2) For oil service: Use an approved compound resistant to oil.

3) For potable water: Use a NSF61 approved pipe compound.

2. End Connections:

a. Threaded Joint:

1) Pipe ends shall be reamed after pipe is cut to final length.

2) Threads shall be cleanly cut to the dimensions of the American Standard for Pipe Threads, ASME B1.1.

3) All burrs, dirt and foreign matter shall be removed and an application of pipe compound given to the threads of both pipe and fittings before assembly.

4) Apply a manufacturer's recommended joint compound prior to installation. Apply joint compound to male threads only.

5) Compound shall be eliminated at the inside of the joint.

6) Once a joint has been tightened, it shall not be backed off unless all threads are re-cleaned and new compound applied.

b. Flanged Connections:

1) All flange faces shall be in perfect alignment with the holes straddling the vertical center line of the piping.

2) Properly center the gasket. Use full-face gaskets for flat-face flanges.

3) Gaskets shall be suitable for the service conditions referenced in Section 40 06 01 - Schedule for and Exposed Piping.

4) The gasket thickness shall be as recommended by the pipe manufacturer, with the exception that:

5) The minimum gasket thickness for raised face flanges shall be ⅛-in.

6) Bolts shall be of sufficient length so that when fully tightened, a minimum of two full threads shall extend beyond the nut.

7) Bolts shall be well lubricated over the entire thread length with a heavy graphite and oil mixture prior to the tightening operation.

8) Bolts shall be tightened with proper wrenches, care being taken to secure uniform pressure on the bolts and gasket and to avoid over stressing of the bolts, dishing of the flanges and compression of the gasket beyond its proper limits.

a) Commercial grade carbon steel bolts, ASTM A307, Grade B shall be tightened to obtain approximately 15,000 psi stress based on the root area of the thread.

b) Alloy steel bolts, ASTM A193, Grade B7 shall be tightened to obtain a stress of 45,000 psi.

c) The pattern for tightening bolts shall be as per the manufacturer's recommendations.

c. Welded Joints:

1) All welding of the following shall be in strict conformity with the Code for Pressure Piping, ASME B31.1, Section 6 and its Supplements:

a) Steel and stainless steel pipe.

b) Steel and stainless steel butt-welding fittings.

c) Steel and stainless steel fabricated fittings.

2) Welding shall not be done when the atmospheric temperature is less than 32°F or when surfaces to be welded are wet.

3) The surface to be welded shall be free from loose scale, slag, rust, paint, oil and other foreign material. Joint surfaces shall be smooth, uniform and free from fins, tears and other defects which might affect proper welding.

4) Backing rings shall be used for all pipe welding butt joints unless otherwise specified.

a) Backing rings shall be of carbon steel with spacer nubs that strike-off or melt with the weld.

5) Field Welding of Stainless Steel:

a) No field welding of any stainless steel pipe or fittings shall be permitted unless otherwise shown on the Contract Drawings.

6) Welding of Cement Lined Steel:

a) Welding of cement lined steel pipe will be permitted only with the approval and under the observation of the Engineer where such welding is shown on the Contract Drawings.

7) The ends of the lined pipe for pipe-to-pipe joints shall be machine cut to provide an approximate bevel of 27½°.

a) Bevels shall be accurately cut by machining or by a mechanically guided cutting torch.

b) Ends may be chipped provided there is no damage to the cement lining.

8) Where fittings already having a bevel of 37½° are to be welded to pipe, pipe ends shall be beveled to a 17½° angle, making a total angle of bevel between joints approximately 55°. A ⅛-in. land shall be provided where possible.

9) Parts to be joined shall be approximately $^{1}/_{32}$-in. apart before tacking.

   a) Backing rings shall not be used at welded joints.

10) Piping shall be carefully aligned before welding and maintain alignment.

11) Small tack welds shall be made using a ⅛-in. electrode.

   a) Defective tack welds shall be removed before the final weld is made.

12) The first bead or layer of welding shall be laid by bridging across from bevel to bevel at the bottom of the groove just at the top of the land. A suitable crown reinforcement layer shall be made on the top of the joint to finish off.

   a) All layers of welding shall be of the same quality as the final welds and shall be fused thoroughly therein.

13) Direct current (dc) shall be used for welding, with the base material on the negative side.

14) Passes:

   a) The first pass shall be a stringer bead using a ⅛-in. electrode with a current of 80A to 90A at 50V to 55V.

   b) The second and succeeding passes shall be woven beads using a ⅛-in. electrode and a current of 90A to 100A at 55V to 58V.

   c) All passes shall be made slowly and with care not to burn through the land or the shoulder into the lining of the pipe.

   d) The joint shall not be hotter than 100°F.

   e) For large size pipe, a $^{5}/_{32}$-in. electrode may be used, provided the temperature of the joint is held within this limit.

   f) The surface of the finished welds shall have a bright metallic luster after cleaning, a fairly smooth and uniform contour with regular ripples and be free from overlaps, undercuts and excessive convexity.

15) No stress-relieving of welded joints is necessary unless the pipe wall thickness warrants it.

16) Welds shall be sound throughout, fused thoroughly and free from gas pockets, oxide, slag inclusions and surface porosity. The inside of the pipe shall be free from globules

of weld metal, spacers or other material which would restrict the pipe area or become loose to enter the fluid stream.

17) Defective or unsound welds shall be corrected by removing and replacing the welds. Pipe or fittings which cannot be re-welded satisfactorily shall be replaced with new pipe or fittings at the Contractor's expense.

18) All welded joints will be visually inspected by the Engineer for defects beyond those acceptable in ANSI B31.1. Method of repair shall be in accordance with instructions as received from the Engineer.

19) Filling of Cement Lined Joints:

a) After the weld is completed, the joints in the lining shall be filled with a special compound of a wet slurry mix of the same cement used for the lining.

b) Where accessible from the end of the pipe, the welded joint shall be swabbed with cement using a paint brush thoroughly wetted with the cement slurry.

20) Repairing of Cement Lined Joints:

a) Any defects causing leaks in welded joints shall be repaired by welding without damaging the cement lining using the procedures specified herein.

3. Hangers and Supports:

a. In addition to the requirements of Section 40 05 07 - Hangers and Supports for Process Piping, install steel and stainless steel pipelines in accordance with the applicable provisions of the Code for Pressure Piping, ASME B31.1, Section 6.

D. Copper and Brass Pipe:

1. End Connections:

a. Soldered Joints:

1) Cleaning:

a) After cutting, all surfaces to be soldered shall be thoroughly cleaned to a metal-bright finish, free from dirt, grease or other material before fluxing and soldering.

b) This cleaning shall be performed by using emery cloth, sandpaper, or steel wool.

c) Clean the outside end of the tubing for a length of ½-in. greater than the depth of the fitting. The inside of the fittings shall be cleaned in a similar manner.

d) Apply non-corrosive flux to both the outside of the tubing and the inside of the fitting.

(1) Acid solder or acid flux will not be allowed.

2) Assembly:

a) Assemble the joint by inserting the end of tube into full depth of fitting socket.

3) Solder:

a) Solder shall be 95-5 tin-antimony solder conforming to ASTM B32.

4) Joining:

a) The surfaces to be joined shall be heated up slowly and uniformly to the melting point of the solder.

(1) Heating torches of sufficient size shall be used for heating of large fittings prior to soldering.

(2) Multiple tips or ring burners for use on combination torches may also be used.

b) The surface being soldered shall be maintained above the melting point of the solder for sufficient time to draw the solder completely into the joint.

c) Form continuous solder bead around entire circumference of joint starting at the bottom.

d) When the solder congeals to a plastic state the excess metal shall be removed with a cloth brush, leaving a fillet around the end of the fitting.

e) Full penetration of the solder uniformly throughout the entire socket is required.

f) The soldered joints shall be allowed to cool in still air until only warm to the hand after which the work may be quenched.

5) Inspection of Joints:

a) Any type of crack, pinhole, area of incomplete penetration, or similar defect will not be accepted.

b) Peening for closing up defects shall not be permitted.

6) Cleaning:

a) Remove all external and internal loose solder and flux after joint cools.

b. Threaded Joints:

1) Use threaded joints for copper process piping any of the following locations:

a) When open flames for soldering are impractical

b) At unions and connections to equipment and appurtenances.

c) Where shown on the Contract Drawings .

2) Flaring for Threaded Joints:

a) Cut the end of the copper tube square and ream to remove burrs.

b) Tubing to be flared shall be soft temper or annealed prior to flaring.

c) Tube that is out of round prior to flaring should be resized back to round..

d) Clean and polish contact surfaces of joints using an abrasive cloth.

e) Place flare nut over end of tube with threads closest to end being flared.

f) Insert appropriate length of copper tubing between flaring bar of flaring tool and position yolk with flaring cone over tube end and clamp yoke in place.

g) Ends of tubing shall be flared at an angle of 45°.

h) Turn the handle of the yolk clockwise without over-tightening.

(1) Use a flaring tool recommended by pipe manufacturer in accordance with the pipe manufacturer's instructions.

i) Pipe joint compound (nor any other material) shall be applied to the mating surfaces of the flare fitting and the flared tube end before attaching the flare nut to the fitting body.

3) Inspection of Flared Joints:

a) Cracked or deformed tubes will be rejected.

c. Unions:

1) Regardless of whether shown or indicated on the Contract Drawings, runs shall contain unions at all connections to valves and equipment, and at distances that permit convenient disassembly of piping and removal of equipment.

2. Pipe Flexibility

a. Make ample provisions for flexibility in all copper and brass pipelines.

E. PVC and CPVC Pipe Installation

1. End Connections:

a. Solvent-Welded Joints:

1) Make all solvent-welded PVC and CPVC joints in accordance with ASTM D2855 and the solvent manufacturer's approved instructions.

2) For PVC pipe, use primers and solvent cements meeting the requirements of ASTM F656 and ASTM D2564, respectively.

3) For CPVC pipe, use solvent cements meeting the requirements of ASTM F493.

4) Do not make solvent cement joints if temperature is below 40°F.

5) Do not make solvent cement welded joints in wet conditions.

6) The following procedure shall be followed to ensure proper gluing of PVC and CPVC pipe.

a) Ensure the end of the pipe is beveled.

b) Apply primer to the female end.

c) Apply primer to the male end.

d) Reapply primer to the female end; the primer must not dry.

e) Apply glue to the male end using an appropriately sized brush.

f) Apply glue with the brush to the female end.

g) Reapply glue to the male end.

h) Join the male and female ends with a quarter turn twist and hold for 30 sec.

7) After joint assembly, wipe excess cement from the pipe. A properly made joint will show a bead around the entire

circumference. Any gaps in this bead indicate a defective joint, and the Contractor shall remake such joints at no additional cost to the City.

b. Threaded Joints:

1) Cut the end of the thermoplastic pipe square and smooth with a knife or a file.

2) Thread the pipe in accordance with the pipe manufacturer's recommendations. Brush threads clean.

3) After threading pipe, starting with second full thread, and continuing over the thread length, wrap 100% virgin Teflon thread tape in the direction of the thread. Overlap each wrap by one-half width of tape.

4) After application of the Teflon thread tape, screw fitting or coupling onto the pipe end to be joined. Hand tighten. Then tighten the connection an additional one or two threads past the point of hand tightness.

F. Additional requirements for exposed steam service piping:

1. For steam service, adhere to the requirements for piping materials as specified in this Section. In addition, exposed piping for steam systems shall adhere to the following additional requirements.

2. End caps on pre-cleaned pipe shall not be removed until immediately before assembly. All open ends shall be capped immediately after completion of installation.

3. Steam systems piping shall have only threaded, welded, or flanged joints, as applicable and as specified.

a. Grooved or shouldered end joints shall not be used for steam service.

b. Welded End Connections:

1) All weld connections shall be in perfect alignment.

2) Use long radius elbows except at expansion bends where elbow radius shall be equal to six times the pipe diameter ($r = 6 \times d$) as specified herein.

a) Mitering of pipe to form elbows is not permitted.

3) Welding tees shall be used wherever the branch line diameter is equal to or one size smaller than the main line diameter. Otherwise the branches shall be fabricated using fittings of or equal to the Weldolet® or Sockolet® type.

4) Reinforced welded tees will be used only where shown on the Drawings. Tapped connections in welded lines shall be

provided using fittings of or equal to the Thredolet® or Latrolet® type, welded to the piping.

c. Flanged End Connections:

1) All flange faces shall be in perfect alignment. Where steel flanges are bolted to flat face cast-iron flanges the raised face shall be removed.

2) Where flanges are to be connected directly to the welded fittings, only welding neck flanges will be allowed.

d. Threaded End Connections:

1) All threaded connections shall have full thread of true taper, accurate to gauge and conform to ANSI.

4. The use of bushings or close nipples is prohibited.

5. Screwed joints shall be made with an approved joint compound applied to the male thread only.

a. Caulking of screwed joints for steam service piping shall not be allowed.

6. In horizontal steam lines, reducing fittings shall be the eccentric type to maintain the bottom of the lines at the same elevation.

7. Slope:

a. All horizontal lines shall be pitched to facilitate draining.

b. Steam piping shall pitch down in the direction of flow at a rate of not less than ¼-in. per 10 ft.

c. All low points shall be provided with ¾-in. hose bibbs properly located so that the entire system may be drained.

d. Drain lines shall not have a pitch less than ⅛-in. per ft.

8. Risers:

a. The location of risers is approximate.

b. Exact locations of the risers shall be as approved.

c. Steam supply downfeed risers shall terminate in a dirt pocket and shall be dripped through a trap to the return line.

9. All closures should be suitable to withstand the hydrostatic test.

3.03 FIELD TESTING / QUALITY CONTROL

A. Test all exposed piping in accordance with the requirements of Section 40 05 05.30 - Leakage Testing for Exposed Piping.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 05.30 – LEAKAGE TESTING FOR EXPOSED PIPING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to test all exposed piping complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Implementation	4
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 05 05 – Exposed Piping Installation.

B. Section 40 06 01 – Schedule for Exposed Piping.

C. 40 05 22- Steel and Stainless-Steel Pipe Process Pipe

D. 40 05 54 Steel Pipe and Fittings

1.04 REFERENCES

A. Definitions:

1. Buried Piping: Includes all piping beginning at the outside face of a structures or foundation and extending away from structures. Buried piping includes piping beneath structures or foundations.

2. Exposed Piping: Includes all piping beginning at the outside face of a structures or foundation and extending inside. Exposed piping also includes all piping embedded in concrete, as well as all piping that is permanently or intermittently submerged and/or installed in a subaqueous environment.

B. Reference Standards:

1. AWWA C600-10 Installation of Ductile-Iron Mains and Their Appurtenances

2. Section 312 of The New York City Plumbing Code.

1.05 DESCRIPTION

A. This scope of this Section includes the requirements for the testing of exposed piping, except where testing requirements for exposed piping are shown or specified elsewhere in the Contract Documents.

B. All exposed pipelines for which testing requirements are specified in this Section shall be watertight or airtight, including, but not limited to:

1. All exposed piping and appurtenances installed under Section 40 05 05 - Exposed Piping Installation.

2. All exposed piping and appurtenances installed under other Sections, but that specify testing under this Section.

C. Piping and structures which fail leakage tests shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Engineer. These repaired piping and structures shall then be retested at the Contractor's expense until leakage test results meet the requirements specified herein.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. Exposed piping testing submittals shall be submitted under the specification section number corresponding to the exposed piping material. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Testing Procedures:

1) Submit proposed testing procedures, methods, apparatus, and sequencing.

2) Testing procedures shall be submitted for approval at least 30 ccd prior to the test.

b. Testing Report:

1) Prior to placing the piping system or structure in service, submit for review and approval a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based.

2. Informational Submittals:

a. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.

b. Results of each specified field quality control test.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. The Contractor shall provide all labor, equipment, air, water and materials, including meters, gauges, blower, pumps, compressors, hoses, fuel, water, bulkheads, temporary bracing and restraints, valves, plugs, and accessory equipment necessary and required to complete the testing as specified herein.

B. Testing medium:

1. The Contractor shall provide all air or gasses necessary or required for testing.

2. Unless otherwise specified, the existing facility shall provide all water required for testing.

a. The Contractor shall provide all means to convey the fluid into the piping being tested.

3. Refer to the Contract Drawings for availability of water to be used for testing.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Notification:

1. Provide the Engineer with written notice at least 14 ccd prior to the date of testing.

a. No tests shall be conducted without an approved written procedure.

b. The Engineer shall respond in writing to the Contractor within 7 ccd of receiving the written notification.

B. All leakage tests shall be conducted in the presence of the Engineer.

1. All leakage tests shall be conducted in the presence of local authorities having jurisdiction, if required.

C. Remove or protect devices and appurtenances that could be damaged by testing.

D. Concealed pipelines:

1. Test all pipelines prior to concealment.

3.02 IMPLEMENTATION

A. General:

1. Perform leakage testing for all exposed piping in accordance with the requirements of Section 40 06 01 - Schedule for Exposed Piping, except piping explicitly shown or specified as exempted from testing. For pipelines not listed in Section 40 06 01:

a. Test all pipelines not listed in Section 40 06 01 via a hydrostatic test with clean water.

b. Test vents and drains in plumbing systems and plumbing pipe lines in accordance with Section 312 of the New York City Plumbing Code, unless otherwise specified. Unless specified otherwise, test all vents and drains on process piping as for plumbing systems.

2. Operation of Existing Facilities:

a. Conduct all tests in a manner to minimize interference with operations of existing facilities or other contractors working on the site.

B. Hydrostatic Testing:

1. Application:

a. Exposed pipelines:

2. Test Procedure:

a. Maintain the testing medium at the specified pressure for a period of 4 hrs.

1) Unless otherwise specified, the testing medium shall be clean water.

2) Do not use air for hydrostatic testing of pipelines intended for liquid service – use compressed air (or gas) only for the hydrostatic testing of air (or gas) pipelines.

b. Test the piping as a whole or in sections.

1) The Contractor shall use valves or install temporary bulkheads at the ends of each section.

2) Remove temporary bulkheads at the conclusion of the hydrostatic testing.

c. Apply the specified hydrostatic test pressure to the piping through a tap in the pipe by means of a pump, compressor, or other approved method.

3. Test Pressures:

a. Test the pipeline at the pressure specified in Section 40 06 01 - Schedule for Exposed Piping.

b. If no test pressure is specified for a hydrostatic test, submit a test pressure of 1.5 times the maximum possible operating pressure of the pipeline, for approval by the Engineer

4. Leakage:

a. The allowable leakage shall not exceed the testing allowance given by the following formula from AWWA Standard C600:

$$L = \frac{S \cdot D \cdot \sqrt{P}}{148{,}000}$$

Where: L = testing allowance (makeup water) (gph).
S = length of pipe tested (ft).
D = nominal diameter of the pipe, (in.).
P = average test pressure during the hydrostatic test (psig).

5. Repair:

a. Replace broken pipe or joint assemblies found to leak.

b. When leakage occurs in excess of the specified amount, locate and repair defective valves, pipe, cleanouts or joints.

c. If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, all at no additional cost to the DEP.

C. Hydrostatic Testing of Valves:

1. Test Procedure:

a. Prior to the application of the test pressure, operate the valve(s) through the number of complete cycles of closing and opening recommended by the manufacturer.

b. Next, apply the test pressure to one side of the valve (i.e., the first side).

1) The valve shall be in the closed position.

2) Introduce the liquid testing medium to the first side only and apply the test pressure.

a) The other side of the valve(s) (i.e., the second side) shall be dry and unpressurized (0 psig).

3) Maintain the testing medium at the specified pressure for a period of 4 hrs.

c. Then, reverse the side to which the test pressure is applied.

1) The valve shall still be in the closed position.

2) Now apply the test medium and pressure to the other side of each valve (i.e., the second side).

3) The side tested first (i.e., the first side) shall now be unpressurized (0 psig).

4) Maintain the testing medium at the specified pressure again for a minimum period of 4 hrs.

d. Hydrostatic testing of valve(s) may be concurrent with hydrostatic testing of pipeline section(s) to the extent permissible by the testing requirements specified herein.

e. The Contractor shall be responsible for draining and disposing of the test medium in accordance with the requirements of the Contract Documents, as necessary and required to test both sides of each valve in this manner.

2. Test Pressure:

a. Hydrostatic test each valve such that the differential pressure across the valve at the same test pressure specified for the pipe in which the valve is installed.

3. Leakage:

a. Stop all external and internal leakage through the valves.

b. No leakage across the valve shall be acceptable.

4. Movement:

a. Stop all valve movement or structural distress.

b. No movement of the valve is acceptable.

D. Leakage Testing of Tanks:

1. Application:

a. Unless otherwise shown or specified, all steel, polyethylene, and fiberglass-reinforced plastic tanks.

2. Test Procedure:

a. Perform test before the installation of mechanical equipment and before applying any waterproofing coatings to the outside surfaces.

3. Bulkhead the openings and fill the structure with water to 6 in. below the overflow water level.

a. The tank shall be kept full until the water temperature has stabilized, but not less than 24 hrs. before the start of the leakage test.

4. Measure the water surface elevation from a fixed point on the tank at two locations 180° apart.

5. Where environmental conditions could lead to changes in water level due to evaporation or precipitation, measurement of these factors shall be made as specified for testing concrete structures.

a. A clear plastic calibrated open-top container not less than 18 inches in diameter and depth shall be partially filled, floated in the tank, and held in position near each measurement location.

b. The container shall be located so as not to be shaded by tank walls and away from any items passing over it such as beams or pipes.

6. The following measurements shall be recorded at each test location at the start of the test period and 24 hours later:

a. Distance from reference point to test water surface.

b. Depth of water in the floating container.

c. Temperature of the test water at 18 inches below water surface.

d. Temperature of the water in the evaporation-precipitation container at mid-depth.

7. The exterior surface of the structure shall be inspected for leakage, especially in areas around joints.

8. Leakage:

a. The change in water surface elevation at each test location shall be averaged.

b. The total change in test water surface elevation shall then be adjusted by the average change in water surface elevation in evaporation-precipitation containers, if applicable.

c. Where averaged water temperature measurements vary by more than 3° F from start to completion of the test period, adjustment in tank volume shall be determined by change of water density resulting from the change in the average water temperature.

9. The leakage test shall be considered failed if there is any measurable drop in the water surface (after adjusting for evaporation and precipitation) during the 24-hour test period or if there is any visible leakage.

10. If visible leaks appear or if leakage exceeds the allowable limit, the structure shall be repaired by removing and replacing the leaking portions of the structure, waterproofing the inside, or by other approved methods. After repairs are complete, the test shall be repeated.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 05 06 – COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all couplings, adapters, and specials in pipelines, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	10
2.03	Fabrication / Assembling / Finishes	16
2.04	Source Quality Control / Shop Tests	16
PART 3	EXECUTION	16
3.01	Examination / Preparation	16
3.02	Installation	16
3.03	Field Testing / Quality Control	17
3.04	Startup / Demonstration	17
3.05	Adjusting / Protection / Cleanup	17

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting.

B. Section 40 05 05 – Exposed Piping Installation.

C. Section 40 05 22 – Steel and Stainless Steel Process Pipe

D. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Reference Standards:

1.	ASTM A47	Ferritic Malleable Iron Castings.
2.	ASTM A193/A193M	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
3.	ASTM A194/A194M	Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
4.	ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes.
5.	ASTM A283/A283M	Low and Intermediate Tensile Strength Carbon Steel Plates.
6.	ASTM A513	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
7.	ASTM A536	Ductile Iron Castings.
8.	ASTM A635	Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.
9.	ASTM A744	Corrosion-Resistant Iron-Chromium-Nickel and Nickel-Base Alloy Castings for Severe Service.
10.	ASTM B26	Aluminum-Alloy Sand Castings.
11.	ASTM D2000	Classification System for Rubber Products in Automotive Applications.
12.	ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form).
13.	ASME B18.2.2	Fasteners in Customary Uses - Hex Nuts.
14.	ASME B31.1	Power Piping.
15.	AWWA	C606 Joints, Grooved and Shouldered Type.
16.	AWWA Manual M11	Steel Pipe - A Guide for Design and Installation.

1.05 DESCRIPTION

A. This Section includes requirements for providing couplings, adapters, and specials in accordance with applicable standards and regulations. In addition:

1. The scope of this Section shall include all buried and exposed process pipe.

2. The extent of process piping is shown on the Contract Drawings. Process pipe service, pipe diameter, pressure rating, joint type, and testing requirements are specified in the following section:

   a. Section 40 06 01, Schedule for Exposed Piping.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include but are not limited to the following activities:

   a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

   b. Perform visual inspection of welding, as per applicable welding code if applicable.

   c. Perform visual and dimensional inspection of completed work.

B. Qualifications of Manufacturers:

1. The manufacturer(s) shall have a minimum of five (5) years of experience in the design and fabrication of coupling, adapter, and specials of similar size, capacity, and type to those shown on the Contract Drawings and specified in the Contract Documents, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

C. Supply and Compatibility:

1. Couplings, adapters, and specials shall be designed, fabricated, and installed in accordance with the latest standards referenced herein.

D. Regulatory Requirements:

1. Use only NSF61-approved materials in potable water lines.

2. Pipe couplings for making field joints between plain end, grooved end, and shouldered end pipe and fittings shall meet the requirements of ASME B31.1.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition:

1. Action Submittals:

a. The Contractor shall submit the following Shop Drawings and material specifications for the approval of the Engineer:

1) Location of couplings, adapters, and specials in pipeline.

2) Catalog data showing dimensions, materials, and component parts of each type of coupling, adapter, or special.

3) Harnessing and restraints where required.

4) Associated pipeline materials.

5) Working and test pressures.

6) Additional product data sufficient to demonstrate compliance with the Contract Documents.

2. Information Submittals:

a. Manufacturer instructions for handling, storing, installing, and adjusting of products.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment and materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store equipment and materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sleeve type couplings shall be as manufactured by:

1. For steel pipelines:

a. Style 38, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

b. Style 128W, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

c. Type 411, as manufactured by Smith-Blair Co., Texarkana, AR.

d. Or approved equal.

2. For ductile iron pipelines:

a. ≤ 12-in.:

1) Style 138, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

2) 12" and smaller - Type 441, as manufactured by Smith-Blair Co., Texarkana, AR.

3) Or approved equal.

b. > 12-in.:

1) Style 38, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

2) Larger than 12" - Type 411, as manufactured by Smith-Blair Co., Texarkana, AR.

3) Or approved equal.

3. For joining dissimilar piping materials:

a. Style 162, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

b. Type 441, as manufactured by Smith-Blair Co., Texarkana, AR.

c. Or approved equal.

B. Groove and shoulder type couplings shall be as manufactured by:

1. For steel pipelines:

a. Groove Type Coupling:

1) Flexible Type:

a) 2-in. through 8-in.:

(1) Style 177V, as manufactured by Victaulic Co., Easton, PA.

(2) Or approved equal.

b) 10-in. through 12-in.:

(1) Style 77 flexible coupling, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

c) 14-in. through 96-in.:

(1) Style W77/W77B AGS flexible coupling, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

2) Rigid Type:

a) 2-in. through 12-in.:

(1) Style 107V, as manufactured by Victaulic Co., Easton, PA.

(2) Or approved equal.

b) 14-in. through 50-in.:

(1) W07 AGS Rigid Coupling. as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

b. Shoulder Type Coupling:

1) AGS Style W77/W77B , as manufactured by Victaulic Co., Easton, PA. .

2) Or approved equal.

c. Welded steel collars for steel pipe > than 24-in.

1) Vic-Ring Type C or Type E, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

2. For ductile iron pipelines:

a. Groove Type Coupling:

1) Flexible Type:

a) Style 31, with flexible radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

2) Rigid Type:

a) Style 31, with rigid radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

b. Shoulder Type:

1) Style 31, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

3. For stainless steel pipelines:

a. Grooved Type Coupling:

1) Flexible type:

a) ¾-in. to 18-in.:

(1) Style 77S, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

2) Rigid Type:

a) 1 ½-in. through 12-in.:

(1) Style 489, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

b) 14-in. through 20-in.:

(1) Style W489, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

4. For copper pipelines:

a. Grooved-type coupling:

1) Rigid Type:

a) Style 606, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

5. For PVC/CPVC pipelines:

a. Grooved Type Coupling:

1) Flexible type:

a) Style 177V, as manufactured by Victaulic Co., Easton, PA .

b) Or approved equal.

2) Rigid Type

a) Style 357 Coupling, as manufactured by Victaulic Co., Easton, PA

b) Or approved equal.

6. For High Density Polyethylene (HDPE) pipelines:

a. Couplings for Plain End Piping:

1) Rigid Type:

a) 2-in. through 14-in.:

(1) Style 905, as manufactured by Victaulic Co., Easton, PA.

(2) Or approved equal.

b) 16-in. through 36-in:

(1) Style 908, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

C. Groove and shoulder type full flow fittings shall be as manufactured by:

1. Victaulic Co., Easton, PA.

2. American Cast Iron Pipe Co., Birmingham, AL.
3. U.S. Pipe and Foundry Co., Bessemer, AL.
4. Or approved equal.

D. Bolted split sleeve type couplings shall be as manufactured by:

1. For steel pipelines:
   a. Restrained flexible couplings:
      1) Style 232 Bolted Split Sleeve, as manufactured by Victaulic Co., Easton, PA.
      2) Or approved equal.
   b. Non-restrained flexible couplings:
      1) 230/231 Bolted Split Sleeve, as manufactured by Victaulic Co., Easton, PA.
      2) Or approved equal.
2. For stainless steel pipelines:
   a. Restrained flexible couplings:
      1) Style 232S Bolted Split Sleeve, as manufactured by Victaulic Co., Easton, PA.
      2) Or approved equal.
   b. Non-restrained flexible couplings:
      1) 230S/231S Bolted Split Sleeve, as manufactured by Victaulic Co., Easton, PA.
      2) Or approved equal.

E. Thread Lubricant:

1. G-N paste (Molycote), as manufactured by Dow-Corning Industries, Auburn MI.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Coupling design and construction shall facilitate easy assembly in the field.
2. Flexible couplings shall be designed and constructed to insure permanently tight joints under all conditions of expansion, contraction, shifting and settlement to which the pipelines may be subjected as a result of the operation and layout of the process system in which they are installed.
3. Rigid couplings shall be designed and constructed to provide a tight joint and prevent pipe movement at the joint.

B. Couplings shall be either one of the following three types:

1. Sleeve Type:
   a. Sleeve type couplings shall be solid (axially un-split/unbolted) and have a middle ring or sleeve placed around the pipe joint.
   b. The middle ring shall be sealed by two wedge-shaped gaskets evenly compressed by follower flanges or rings tightened by bolts and nuts.
2. Groove and Shoulder Type:
   a. Groove and shoulder type couplings shall have a C-shaped (cross section) sealing gasket placed around the joint.
   b. The gasket shall be enclosed in a split-type housing which shall engage shoulders or grooves in the pipe.
   c. The housing shall be assembled by bolts and nuts.
3. Bolted Split Sleeve Type.

C. Sleeve Type Couplings:

1. General:
   a. The maximum working pressure of the sleeve-type couplings shall be not be less than:
      1) For pipe sizes ≤ 54 in.: 250 psig.
      2) For pipe sizes > 54 in. 200 psig.
2. For Steel Pipe Lines:
   a. Materials of Construction: steel.
   b. The middle ring or sleeve and the follower rings or flanges shall be steel, ASTM A 283/A 283M (Grade A).
   c. The middle ring or sleeve shall have flared or beveled ends.

d. The follower rings or flanges and the middle ring or sleeve shall be true circular sections free from irregularities, flat spots or surface defects.

e. The middle ring or sleeve shall not have a center pipe stop, unless otherwise specified, and shall have the minimum dimensions specified in Table 40 05 06-1.

TABLE 40 05 06-1
MINIMUM DIMENSIONS FOR SLEEVE TYPE COUPLING MIDDLE RING

Nominal Pipe Diameter: (in.)	Middle Ring Thickness: (in.)	Middle Ring Length: (in.)
≤ 8	¼	5
10 - 30	⅜	7
> 30	½	10

f. After welding, welded steel follower rings shall be sized and tested by cold expanding a minimum of 1% beyond the yield point.

3. For Ductile Iron Pipe Lines:

a. Materials of Construction:

1) For pipe sizes ≤ 12 in.: ductile iron or steel.

2) for pipe sizes > 12 in.: steel.

b. The middle ring or sleeve shall be steel, ASTM A513 or ASTM A635.

c. The middle ring or sleeve shall have flared or beveled ends.

d. The follower rings or flanges shall be of ductile iron, ASTM A536, or malleable iron, ASTM A47 (Grade 32510), for pipe sizes 12-in. and smaller, and shall be of steel ASTM A283/A283M (Grade A) for pipe larger than 12-in.

e. The middle ring shall not have a center pipe stop, unless otherwise specified, and shall have the same minimum dimensions as specified above for couplings for steel pipe.

4. Gaskets:

a. Gaskets shall be resilient, wedge-shaped gaskets with a maximum angle of 40° at the wedge end.

b. Gasket material shall be compatible with the type and temperature of the fluid in the pipeline, and shall be the material recommended

by the manufacturer for the service specified in Section 40 06 01, Schedule for Exposed Piping.

D. Groove and Shoulder Type Couplings:

1. General:

a. Couplings shall be of the following types:

1) For steel pipe ≤ 24-in.: grooved type

2) For steel pipe > than 24-in.: suitable welded steel collars shall be welded to the pipe ends, furnished by the same manufacturer as the groove and shoulder type coupling.

b. Unless otherwise specified, groove-type couplings shall conform to the requirements of AWWA C606.

2. Materials and Construction:

a. Housing:

1) Housing shall be in two or more parts, closely fitting the pipe and gasket.

2) Housing material shall be ductile iron, ASTM A536 (Grade 654512), except for stainless steel and aluminum pipelines, which shall have housings of Type 316 stainless steel, ASTM A744 Grade CF-8M, and aluminum, ASTM B26, Alloy 356-T6, respectively.

b. Gaskets:

1) Gaskets shall be of materials compatible with the type and temperature of the fluid in the pipeline, and shall be of the material as recommended by the coupling manufacturer for the service specified in Section 40 06 01, Schedule for Exposed Piping.

2) Gaskets shall be molded so that internal pressure tightens the seal. All gaskets shall be continuous, uniform in texture, and free from surface blemishes and defects.

E. Groove and Shoulder Type Fittings:

1. For steel and ductile iron pipe ≤ 24-in.:

a. Grooved end fittings shall be cast of ductile iron with working pressure ratings not less than shown in Table 40 05 06-2.

2. For steel and ductile iron pipe > 24-in.:

a. Fittings shall be provided with shoulders.

b. Working pressure ratings shall not be less than 150 psig.

c. Fabricated steel fittings shall be provided with extra-long end pieces to suit the coupling.

3. For stainless steel pipe:

a. Grooved end fittings shall be Type 304 matching the thickness or schedule of the stainless steel pipe shown in the pipe schedule Section 40 06 01, Schedule for Exposed Piping.

TABLE 40 05 06-2
WORKING PRESSURE RATINGS FOR GROOVED END FITTINGS

Nominal Pipe Diameter: (in.)	Working Pressure: (psig)
¾ - 6	1,000
8 - 12	800
14 - 22	300
24	250

4. For Copper Pipe:

a. Grooved end fittings shall be provided with rolled grooves and shall be designed for a working pressure not less than 300 psig.

F. Bolted Split-Sleeve Type Couplings:

1. General:

a. Couplings for large diameter steel piping shall be bolted, split-sleeve type.

b. Bolted split sleeve type couplings shall consist of four (4) basic components: two-piece housing, gasket assembly, bolts and nuts with restraining end rings as required for pipe restraint.

c. The selected couplings shall be designed for the type, size and working pressure of the pipe with which they are to be used.

2. Materials and Construction:

a. For stainless steel pipe: Coupling housing shall be manufactured from Type 316 stainless steel.

b. For carbon steel pipe: Coupling housing shall be manufactured from carbon steel.

3. The split-sleeve coupling shall be constructed with a double arch cross section which closes around either:

a. pipe section ends that have been smoothed for expansion or contraction, or

b. pipe section ends with steel end rings affixed for restraining purposes.

4. The coupling shall confine an elastomeric gasket beneath the sleeve arches to create a radial seal as the coupling closes.

5. Elastomeric gasket materials shall have properties as designated by ASTM D2000 suitable for air service up to 240°F with intermittent exposure to 280°F.

6. Gasket sealing members shall consist of two O-ring gaskets and an elastomeric sealing pad bonded to an integral sealing plate. Internal pressure shall not be a requirement for fully completing the sealing function.

7. Restraining rings shall be furnished with the couplings and shall be of the same material as the coupling housing.

   a. Restraining rings for fixed type couplings shall be shop welded to the piping by the piping fabricator.

   b. The restraining rings shall be forwarded to the piping fabricator for shop mounting and welding in place.

   c. The coupling manufacturer's recommendation for size and amount of welding required for properly attaching the restraining rings shall be followed without exception.

8. When deflection is required at a pipe joint, a flexible coupling shall be provided.

   a. Minimum deflection for basic, lighter duty split sleeve (non-shouldered) design (e.g., Victaulic® Depend-O-Lok® Type 1) couplings shall be as specified in Table 40 05 06-3:

TABLE 40 05 06-3
MINIMUM DEFLECTION FOR BASIC, NON-SHOULDERED SPLIT SLEEVE COUPLINGS

Nominal Pipe Diameter: (in.)	**Minimum Deflection: (deg.)**
8 - 14	4.50
16-24	4.00
30 and 36	3.00
42 - 54	2.00
60	1.75

66 and 72	1.50
≥ 84	1.00

b. Maximum deflection for heavier duty (shouldered) design (e.g., Victaulic® Depend-O-Lok® Type 2) couplings shall be as recommended by the manufacturer.

c. Coupling width shall not be less than 10-in. for pipe sizes 8-in. through 84-in., and not less than 12-in. for larger size pipe.

d. Minimum wall thickness of couplings shall be computed by the following formula:

$$t = \frac{P \cdot d}{2s}$$

Where: P = Design pressure in psig.
d = Pipe O.D. in in..
s = 18,000 psig design stress.

9. Bolts, nuts and miscellaneous hardware shall be furnished by the coupling manufacturer and shall be Type 316 stainless steel conforming to ASTM A276 and having a minimum tensile strength of 85,000 psig.

G. Bolts and Nuts:

1. Bolts:

a. Bolts shall be Type 316 stainless steel, ASTM A 193/A 193M, Grade B8, Class 2.

b. Bolts shall have American Screw Threads, Coarse Thread Series, ASME B1.1.

c. For all sleeve-type couplings, bolts shall be double radius head or buttonhead track type. The collars under the heads shall fit oval or square holes in the follower rings.

d. For all groove-and shoulder-type couplings, bolts shall be track type oval neck bolts. The collars under the heads shall engage the oval slots in the housing.

2. Nuts:

a. Nuts shall be Type 316 stainless steel conforming to ASTM A194/A194M.

b. Nuts shall be American Standard Heavy Dimension Series, ASME B18.2.2.

H. All flexible couplings shall be harnessed.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Inspection:

1. The Contractor shall not install damaged items until repairs are made in accordance with manufacturer's written instructions and approval by Engineer.

a. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement.

B. Preparation:

1. Ends of pipe, fittings and couplings shall be cleaned of all scale, dirt and thick outside coatings.

2. Before assembly, the ends of pipe and/or fittings and the outside of the coupling gasket shall be lubricated as recommended by the manufacturer.

3. Fasteners shall be assembled using a thread lubricant.

3.02 INSTALLATION

A. Install couplings, adapters, and specials for process piping in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings. In addition:

1. Couplings shall be assembled by tightening diametrically opposite bolts evenly and progressively.

a. Bolts on sleeve-type couplings shall not be tightened beyond the point of stretching (when the mill scale on the shank begins flaking off).

b. Bolts on groove- and shoulder-type couplings shall be tightened only until there is metal to metal contact between housing segments and the pipe.

B. Field Assembly of Groove-type Couplings:

1. Field grooving of pipe shall not be done unless approved by the Engineer, and then shall be limited to steel pipe 24-in. or under nominal diameter and to ductile and cast iron pipe 12-in. or under nominal diameter.

2. Field grooving shall be done only with special tools provided by the coupling manufacturer.

C. Harness for Sleeve-type Couplings:

1. In all pipelines under pressure, and elsewhere where shown, specified or required, sleeve-type couplings shall be harnessed.

a. On all pressurized steel pipe, cast steel "crow-foot" lugs shall be welded on diametrically opposite sides of the pipe, and the joint shall be harnessed with stainless steel tie-bolts and nuts.

1) The dimensions, sizes, spacing and materials for lugs, tie-bolts and nuts shall be based on the use of a minimum of two bolts and four lugs per joint, in conformity with Section 13 (Table 13.4) of AWWA Manual M11 or the standard specifications of the coupling manufacturer for the pipe size, wall thickness and test pressure specified.

2) Welding shall conform to the requirements specified under Section 40 05 22 - Steel and Stainless Steel Pipe.

b. On all pressurized ductile iron pipe, couplings shall be harnessed with stainless steel tie bolts and nuts connected to flanges or fittings installed on the pipe on each side of the coupling as shown, specified or required for the pipe sizes and specified test pressures.

1) The harnessed length from flange to flange shall not exceed 3 ft.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 07 – HANGERS AND SUPPORTS FOR PROCESS PIPING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all hangers, supporting devices, and appurtenances shown, specified or required for pipes, fittings, valves, and other in-line equipment, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	14
2.04	Source Quality Control / Shop Tests	14
PART 3	EXECUTION	14
3.01	Examination / Preparation	14
3.02	Installation	14
3.03	Field Testing / Quality Control	18
3.04	Startup / Demonstration	18
3.05	Adjusting / Protection / Cleanup	18

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 03 60 00 – Grouting.

C. Section 05 05 13.10 – Galvanizing.

D. Section 05 50 00 – Metal Fabrications.

E. Section 09 91 00 – Painting.

1.04 REFERENCES

A. Reference Standards:

1.	ASTM A 36	Standard Specification for Carbon Structural Steel.
2.	ASTM A 48	Standard Specification for Gray Iron Castings.
3.	ASTM A 276	Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
4.	ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
5.	ASTM A778	Standard Specification for Welded, Un-annealed Austenitic Stainless Steel Tubular Products.
6.	ASME - B31.1	Power Piping.
7.	N.Y. Spec 32-P-6	Pipe, Special Castings, Valve Box Castings: Cast-Iron.
8.	MSS SP-58	Pipe Hangers and Supports - Materials, Design and Manufacture.
9.	MSS SP-59	Short Radius Welding Fittings.
10.	MSS SP-69	Pipe Hangers and Supports - Selection and Application.
11.	MSS SP-89	Pipe Hangers and Supports - Fabrication and Installation Practices.
12.	MSS SP-90	Guidelines on Terminology for Pipe Hangers and Supports.
13.	ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

14. Latest Edition of the New York City Building Code.

1.05 DESCRIPTION

A. This Section includes requirements for providing hangers and supports for process piping in accordance with applicable standards and regulations.

1. Included are rod hangers; clevis hangers, spring hangers; stanchion, roller and pipe pole supports and saddle stands; supports of structural steel; concrete saddles, concrete anchor blocks and bases, and all necessary guides, restraints, fastening devices, anchor bolts, pipe anchors and appurtenances.

2. The Contractor shall provide all temporary pipe supports required during construction.

3. The Contractor shall provide hangers and supports of sufficient strength to maintain the pipelines and appurtenances in proper position and alignment under the maximum combination of peak loading conditions to include pipe weight, process fluid/gas weight, process fluid/gas movement and pressure forces, thermal expansion and contraction, vibrations, seismic forces, and all probable externally applied forces for all operating conditions.

4. The Contractor may retain the services of a pipe support designer for providing the design of all piping hangers and support systems in accordance with the requirements of this Section, unless otherwise shown or specified.

5. Stressors in hangers, rods and brackets shall be in accordance with Table 2 of MSS-SP-58.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but are not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual inspection of welding, as per applicable welding code if applicable.

c. Perform visual and dimensional inspection of completed work.

B. Qualifications of Manufacturer and Pipe Support Designer:

1. Pipe hangers, supports, and appurtenances shall be standard products of the manufacturer specified herein.

2. Each type of hanger and support shall be the product of a single manufacturer.

3. The pipe support designer, if retained by the Contractor, shall have a minimum of five (5) years of experience in the design of pipe supports and shall show evidence of having completed at least five (5) substantially

similar, successful pipe support projects of equal complexity as the systems specified.

a. The pipe support designer shall be a New York State Registered Professional Engineer.

C. Supply and Compatibility:

1. All hangers and supports for process piping included in this section shall be provided by the Contractor through a single, qualified ductile iron process pipe manufacturer.

2. The pipe and fittings shall be designed, fabricated, and installed in accordance with standards referenced herein.

D. Regulatory Requirements:

1. All hangers and supports shall conform to the applicable requirements of ASME B31.1, MSS SP-58, SP-59, SP-69 and SP-90, except as modified herein, and be of standard manufacture wherever possible, and best suited for the service required.

2. Unless otherwise approved, all hangers, supports and concrete inserts shall be listed with Underwriters' Laboratory, Inc.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Shop Drawings shall include, but not be limited to:

1) Detailed drawings showing all hangers and supports for each piping system. Drawings shall show:

a) Location, installation, material, loads, forces, stresses and deflections of all hangers and supports.

b) Reaction forces imparted to structures to which hangers and supports are attached shall be shown.

c) Contractor shall provide detailed drawings of each pipe support. Each drawing shall contain enough information to verify the pipe support design and to allow the manufacture of the device. At a minimum, the Contractor shall submit:

(1) Scaled details of the device with dimensions.

(2) A table of applied forces and moments.

(3) A complete bill of materials.

(4) An isometric showing the applied forces and moments.

(5) Detailed connections to existing structure.

(6) Shop and field welds.

2) Manufacturer's catalogs and engineering data on all hangers and supports.

3) Load ratings.

4) Materials.

5) Installation details.

b. Submit the name and qualifications of the support and hanger engineer.

c. All drawings and design calculations included in the shop drawings shall be signed and sealed by a New York State Registered Professional Engineer.

d. Pipe support design shall include detailed load and movement calculations:

1) In the design of hangers, supports and anchors, unless otherwise shown or specified, pipe pressures shall be the maximum test pressures specified for pipelines carrying gases and twice the maximum test pressures specified for pipelines carrying liquids.

2) The following loads shall be included in pipe support design and pipe stress analysis:

3) The gravity force, including the weight of the pipeline plus the weight of any appurtenances, contents, insulation, etc.

4) The thermal expansion force developed by the restraint of free end displacement of the piping.

5) Hydrostatic forces developed by internal pressure during operation of the piping system.

6) Loading due to expansion joint reaction forces.

7) Seismic forces, as required by the latest edition of the New York City Building Code.

8) Occasional load calculations and pipe stress analysis shall be provided where required by the Contract Documents, Building Codes, or Standards referenced herein. Occasional loads include:

a) Seismic forces.

b) Pressure waves produced by sudden changes in fluid momentum, commonly referred to as water hammer.

c) Wind, snow or ice loads.

d) Safety valve thrust loads.

e. Calculated forces shall be included in the pertinent shop drawings as called for by the submittal requirements specified herein.

2. Information Submittals:

a. When equipment or appurtenance manufacturers have indicated that piping loads shall not be transmitted to their equipment or appurtenance, certification that from said manufacturer(s) that the Contractor's hanger and support design complies with said manufacturer(s) requirements. Submit a separate certification for each equipment or appurtenance bearing piping loads supported, in whole or in part, by Contractor's hanger and support design.

B. Each submittal package for pipe hangers and supports shall have the stamp of a New York State Registered Professional Engineer experienced in pipe support design .

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment and materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Hanger inserts which are to be embedded in cast-in-place concrete shall be delivered in ample time not to delay the Work.

B. The Contractor shall store equipment and materials provided under this Section in accordance with the requirements of the Contract Documents.. In addition:

1. Hangers and supports shall be protected from condensation, corrosion, and deterioration.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. General:

1. The Contractor shall provide hangers and supports for all process piping and associated appurtenances, including, but not limited to valves, fittings, and specials, as follows:

a. Where shown on the Contract Drawings: Provide hangers and supports as shown and as specified herein.

b. Where not shown on the Contract Drawings: Provide hangers and supports in compliance with MSS SP-58 Table 2, and the requirements specified herein.

2. All hangers and supports shall allow minimum 3-in. of vertical adjustment.

B. Types:

1. Hangers for Single Pipes:

a. Single pipes shall be supported by hangers suspended by rods from structural steel members, inserts in concrete ceilings and beams, bottom of trapeze hangers and wall mounted steel angle brackets. The strength of the rod shall be based on its root diameter.

b. Except for piping subject to thermal expansion and contraction or as otherwise shown or specified, pipe hangers shall be adjustable clevis type MSS SP-58 Type-1.

c. Piping subject to thermal expansion and contraction shall be supported on rollers.

2. Hangers or Supports for Multiple Pipes:

a. Multiple pipes, running parallel in the same horizontal plane, and adjacent to each other, shall be suspended by trapeze type hangers or supported on wall brackets. Trapeze hangers shall consist of channel sections supported from threaded rods or attached to concrete walls, columns or structural steel support members.

b. Except as otherwise specified herein, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets, shall be anchor or pipe chairs as required.

3. Supports for Single Pipe:

a. Single pipes located in a horizontal plane close to the floor shall be supported by one of the methods specified herein or as shown on the Contract Drawings.

b. Pipes shall be supported by adjustable stanchions, pipe saddle or roll supports with "U" bolts. Stanchions shall provide at least 4-inches adjustment and be flanged-mounted to floor.

c. Stanchions and saddle stands shall be of Type 316L stainless steel.

d. Pipe pole supports for pipe runs above ground, out-of-doors, and where otherwise required, shall consist of a suitable length of stainless steel pipe set upright in at least four feet of concrete; two stainless steel angles secured to the top of the pipe, at right angle and on each side; a stainless steel plate welded to the top of the

angles to serve as a horizontal support for the pipes. Supports shall be provided with attachments in the form of stands, clamps, rolls, rods or similar devices of the screw adjustable type in the vertical direction.

e. Where specified or shown, column supports of built-up welded stainless steel shall be provided, as approved by the Engineer.

f. Pipe rollers shall be cast ductile iron, unless otherwise shown or specified. Hardware and appurtenances shall be stainless steel.

4. Wall Supported Pipes:

a. Single or multiple pipes located adjacent to walls, columns or other structural members, and an excessive distance from ceilings or underside of beams, shall be supported using stainless steel wall brackets, MSS SP-58 Type 32 or 33.

b. Where pipes rest on top of bracket pipe supports, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chairs as required

5. Supports for Base Elbows:

a. Where pipes change direction from horizontal to vertical through a bend, a welded or cast base anchor support shall be installed at the bend to carry the load.

6. Supports for Vertical Pipes:

a. Pipe riser clamps shall be used to support all vertical pipes extending through floor slabs.

b. Riser clamps shall be MSS SP-58 Type 42 or 8.

c. Insulation shall be removed from insulated pipes prior to installing riser clamps.

7. Supports for Process Air Piping:

a. Air piping shall be supported on stainless steel saddle type supports in the locations shown on the Contract Drawings and as specified.

1) Fixed supports, as located on the Contract Drawings, shall hold the pipe firmly in place, preventing any movement.

2) Sliding supports, as located on the Contract Drawings, shall allow longitudinal movement of the pipe to account for thermal expansion.

3) Guides, as located on the Contract Drawings, shall allow for longitudinal pipe movement while preventing lateral movement and maintaining alignment.

b. Supports shall be fabricated Type 316L stainless steel.

1) Saddles shall support 120° of the pipe circumference and at least 12-in. along the length of the pipe.

2) Saddles shall be bolted to the structural steel or concrete slab supports.

3) Straps shall be of Type 316 stainless steel.

4) All sliding supports shall be provided with 8-in. wide hold-down straps.

5) Straps shall not clamp down on the pipe, but shall allow the pipe to slide on the saddle to permit thermal expansion.

c. All sliding supports shall have a resilient bearing pad of Teflon attached to the saddle to allow the pipe to slide on the saddle to permit thermal expansion.

d. All hangers from overhead supports shall be saddle or cradle-type hangers which shall support the lower 120° of pipe circumference and a minimum length equal to one quarter the pipe diameter, but not have less than 6-in. or more than 12 in..

1) Where pipe is supported from existing slabs, new through-slab hanger rods shall be used instead of expansion bolts, except where otherwise authorized by the Engineer.

8. Supports for Pipelines with Thermal Expansion:

a. Pipe rolls for single rod hangers: Stainless steel frame construction, ductile iron roller and stainless steel roller rod provided with threaded nuts; vertical adjustment permitted; for pipe sizes 6 in. or less unless otherwise approved.

b. Pipe rolls for double rod hangers: Ductile iron roller, stainless steel roller rod, malleable iron threaded sockets which permit vertical adjustment.

9. Supports for Pipelines Subject to Temperatures Greater than 300°F:

a. Spring hangers of heavy stainless steel construction.

10. Supports for Thermoplastic Pipes:

a. All thermoplastic pipe attachments shall have a continuous bearing cradle or saddle on the lower 120° of pipe circumference and a minimum length of one quarter pipe diameter, but not less than 6-in. nor more than 12-in..

11. Supports for Copper & Brass Pipes:

a. All copper and brass pipe supports shall be specifically manufactured for use with copper and brass pipe.

b. Hangers shall be provided with a copper finish.

12. Hangers for Radiators:

    a. Support wall hung radiators on approved wall brackets or overhead hangers.

    b. Support wall hung radiators by all-metal brackets and plates that are screw adjustable after erection.

        1) Wall plates shall be made of stainless steel of size and shape to insure rigidity and strength and with a minimum resistance to expansion.

        2) Plates shall be fastened directly to walls, columns or pilasters with at least one ½-in. bolt, and with spacing of brackets not in excess of 42-in..

    c. Where rod hangers are specified or shown supporting wall radiators, supporting rods shall be not less than ⅝-in. in diameter.

13. Concrete Supports:

    a. Where pipeline or mechanical equipment is shown, specified or required to be supported on concrete supports, supports shall be as specified herein.

    b. Concrete supports for equipment shall be of a size and mass that will resist all forces, both static and dynamic, which may be developed by the equipment.

    c. Concrete supports for pipe, fittings, valves and appurtenances shall be designed to carry the weight of the pipeline and appurtenances.

        1) Cradles and anchor blocks shall safely withstand all stresses imposed by the pipelines, under all operating conditions.

        2) Concrete cradles shall be shaped to fit the contour of the pipe.

    d. Concrete supports shall be anchored to the floor of main structures by doweling or other approved means.

        1) Anchor bolts, extension plates, saddle yokes and other hold-down devices in concrete bases shall be placed before pouring of concrete.

        2) Expansion bolts shall not be used on new concrete supports except with the specific approval of the Engineer.

    e. Concrete supports shall be not less than Class 25 as specified in Section 03 30 00, Cast-in-Place Concrete.

14. Protection Saddles for Insulated Pipe:

    a. Contractor shall furnish steel protection saddles on all supports for insulated pipe.

b. For insulated pipes < 12-in. nominal diameter:

1) Provide saddles of No. 14 U.S. gauge stainless steel curved 180° for use with roller hangers or structural trapeze hangers.

2) Provide saddles of No. 16 U.S. gauge stainless steel curved 120° for use in clevis hangers.

3) Saddles shall be at least 12-in. long.

4) Saddle gripping side edges shall be turned up at least to the thickness of insulation.

c. For insulated pipe ≥ 12-in. nominal diameter:

1) Provide saddles of No. 12 U.S. gauge stainless steel with a welded centerplate to provide three-edge support.

2) Saddles shall:

a) Be at least as long as the pipe diameter.

b) Provide 120 degree coverage.

c) Have edge and centerplate depths equal to the insulation thickness.

C. Materials:

1. Hangers and supports shall conform to ASME B31.1.

2. Structural steel shall conform to ASTM A36 and ASTM A283.

3. Iron castings shall conform to ASTM A48 (Class No. 35).

4. Stainless steel shall conform to ASTM A 276:

a. Use type 316 stainless steel for non-welded items.

b. Use type 316L stainless steel for welded or fabricated items.

c. Tensile Strength: 70,000 psi, minimum.

d. Yield Strength: 25,000 psi minimum.

e. Elongation in 2-in.: 35%.

f. Reduction of area: 45%.

g. For stainless steel pipe and tube: Use type 316L stainless steel conforming to the requirements of ASTM A778.

5. Rollers:

a. Rollers, including stands and bases, shall be of cast iron, hot-dipped galvanized conforming to ASTM A123.

6. Expansion anchors for use in existing concrete structure:

a. Material shall be Type 316 stainless steel.

7. Hanger Rods:
   a. Material shall be Type 316 stainless steel.
   b. Maximum allowable working stress shall be 5,800 psi, calculated based on the root diameter.
   c. Rods shall have a square head nut on top and running thread on bottom end.
8. Supports:
   a. Material shall be Type 316 stainless steel.
9. Appurtenances:
   a. Brackets, guides, restraints, rods, bolts, nuts and anchors shall be Type 316 stainless steel unless otherwise specified.
   b. Concrete inserts shall be of malleable iron with galvanized finish.

D. Sizing:
1. Size single and double rods based on the nominal pipe diameter in accordance with the Table 40 05 07-1.
   a. Hanger loads shall be calculated based on the weight of pipe filled with water plus 50 psf of dead load.

TABLE 40 05 07-1
MINIMUM PERMISSIBLE HANGER ROD DIAMETER FOR NOMINAL PIPE SIZES

Pipe Size (in.)	Single Rod (in.)	Double Rod (in.)	Max. Load per Hanger (lbs.)
¾ to 1½	⅜	⅜	300
2	⅜	⅜	325
2½	½	⅜	350
3	½	⅜	400
3½	½	⅜	450
4	⅝	½	850
5	⅝	½	950
6	¾	⅝	1,075
8	*⅞	⅝	1,350
10	*⅞	⅝	1,750

Pipe Size (in.)	Single Rod (in.)	Double Rod (in.)	Max. Load per Hanger (lbs.)
12	*⅞	¾	2,200
14	*1	⅞	2,500
16	*1	⅞	3,075
18	*1	⅞	3,700
20	*1¼	1	4,425
24	*1¼	1	6,050

* To be used subject to the Engineer's specific approval

E. Concrete Inserts, Attachment Plates, and Clamps:

1. Hanger Rods:

a. Hanger rods up to ⅞-in. diameter: Shall be attached to new concrete structures using concrete inserts of Type 18 in MSS SP-58.

1) Inserts shall be malleable iron with galvanized finish.

a) The use of steel inserts is prohibited.

2) Design of the inserts shall permit the rods to be adjusted laterally in one plane and to lock the rod nut or head to the body.

3) The inserts shall be provided with openings or recesses to receive reinforcing rods.

4) To facilitate installation, slots shall be provided in the exposed flanges of the insert.

5) Inserts shall be rated to safely carry the maximum load which can be supported by the hanger rod.

b. Hanger rods larger than ⅞-in. diameter: Shall be attached to new concrete by means of approved hook anchors as shown on the Contract Drawings.

c. All hanger rods shall be attached to existing concrete structures using stainless steel expansion anchors as specified in Section 05 50 00 - Metal Fabrications.

2. Steel beam clamps:

a. Shall be malleable iron.

b. For wide flange or I-beams: conform to MSS SP-58 Type 28 or Type 29.

c. For channel sections or where it is necessary to locate the hanger rod off the beam centerline: conform to MSS SP-58 Type 20.

3. Steel U-shape beam attachments welded to the underside of beams and welded steel brackets fastened to structural steel columns:

a. Shall be subject to specific approval of the Structural Steel and Pipe Supports Shop Drawings.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Galvanizing:

1. Conform to the requirements of Section 05 05 13.10, Galvanizing, except as follows:

a. Malleable iron and concrete inserts shall be galvanized in conformance with the manufacturer's specifications.

B. Painting:

1. Conform to the requirements of Section 09 91 00, Painting.

C. Surfaces Protection:

1. Surfaces of hangers and supports in contact with aluminum, brass, plastic and copper pipelines or pipeline equipment shall be protected with an approved plastic coating to prevent abrasion.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. The City may elect to conduct shop inspections. The inspections may include but not be limited to: mechanical and chemical testing, material sampling, material certifications, traceability of parts, blasting and painting, visual and dimensional inspection, and free iron contamination check on stainless steel parts.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall coordinate the Work such that all process piping hangers, supports, and restraining systems shall be installed and secured prior to the testing or activation of the process pipeline on which they are installed.

3.02 INSTALLATION

A. Design:

1. Types of hangers and supports shall be kept to a minimum.

2. Wherever possible, pipe supports shall be designed using manufacturer's standard catalog products.

3. Hangers and supports shall be located to prevent vibration or swaying and to provide for expansion and contraction.

4. Hanger and support units installation methods shall be in accordance with manufacturer's recommendations.

5. Hangers and Supports for piping systems subject to thermal expansion and contraction, or to similar movements imposed by other sources, shall be designed to provide flexibility, and pipe stress analysis shall be provided.

   a. Hangers and supports shall provide for expansion and contraction throughout the full operating temperature range.

6. Where resonance with imposed vibration and/or shock occurs during operation, suitable dampeners, restraints, anchors, etc., shall be added to remove those effects.

7. Hangers' rods shall be straight and vertical. Chain, wire, strap or perforated bar hangers shall not be used. Hangers shall not be suspended from piping.

8. Contact between dissimilar metals shall be prevented by use of copper plated, rubber or vinyl coated hangers or supports.

B. Hangers and Supports Embedded in Concrete:

1. Concrete embedded items shall be installed before concrete placement.

2. Embedded items shall be fastened securely to prevent movement during concrete placement.

3. Hangers and supports shall be adjusted and grout placed as specified in Section 03 60 00, Grouting, to bring pipelines to specified elevations.

C. Supports and Hangers for Horizontal Pipes:

1. Supports and hangers for all piping shall be placed no farther apart than shown below, unless otherwise shown or specified:

   a. For ductile iron, steel, and stainless steel pipe:

      1) Maximum spacing in accordance with Table 3 of MSS-SP-69. The designer should check the capacity of the steel or building structure to which the hanger or support is attached, and adjust the maximum spacing accordingly.

      2) In addition, ductile iron pipe shall have a minimum of two supports per length and shall have a hanger or support adjacent to each end.

   b. For thermoplastic pipe, based on the following nominal pipe diameters:

      1) ≤ 1-in. dia.: 2 ft-6 in. center to center.

      2) 1½-in. to 3-in. dia.: 4 ft-0 in. center to center.

      3) 4-in. to 8-in. dia.: 6 ft-0 in. center to center.

      4) > 8-in. dia.: 8 ft-0 in. center to center.

c. Tubing less than 1-inch diameter: In accordance with best piping practice and ASME B31.1, and as approved by the Engineer.

2. Hangers, supports, and accessories shall be located within maximum span lengths specified to support continuous pipeline runs unaffected by concentrated loadings.

3. Where hanger or support spacing does not correspond with joist or rib spacing, structural steel channels shall be attached to joists or ribs, and the pipes suspended therefrom.

D. Supports for Vertical Piping:

1. Spacing:

a. Vertical piping shall be supported at each floor and between floors by stays or braces to prevent rattling and vibration. Maximum spacing shall not exceed 25 ft.

2. Riser Clamps:

a. Riser clamp shall be placed under hub, fitting or coupling with approved solid bearing on steel sleeve.

b. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.

3. Base elbows or welded equivalent shall be provided at vertical piping bases.

4. Top support shall have a horizontal connection, and provide for pipe expansion.

E. Pipelines installed under plumbing work shall be spaced in conformity with the requirements of the New York City Building Code or as specified herein.

F. Additional Supports:

1. In addition to any and all requirements for the placement of supports specified herein, the Contractor shall provide additional supports as follows:

a. Additional supports shall be placed immediately adjacent to any change in piping direction, at equipment, and on both sides of valves, expansion joints and couplings.

b. Suspended or supported ductile iron pipe shall have a hanger or support adjacent to each hub or flanged end.

c. Except where otherwise shown or required, horizontally valves 6-inches and larger shall be supported on each side of the valve, by pipe hangers or supports.

d. At all flexible couplings, supports shall be placed on each side and as close to the coupling as possible. Supports shall be the guide type which prevent axial movement from resulting in pipe deflection and misalignment.

e. Supports, anchorage and guidance for grooved end pipe shall be in accordance with the applicable sections of these specifications and the recommendations of the manufacturer.

G. Anchors and Sway Braces:

1. Anchors and sway braces shall be provided when required to hold the pipelines and equipment in position or alignment. Pipe anchors and braces for rigid fastening to the structures shall be attached to stainless steel anchor plates and anchor bolts set into the forms when placing concrete of new structures. Brackets and braces shall be attached to existing concrete structures with through bolts or expansion anchors.

2. Anchors, guides and restraints shall be provided for the proper operation of pipeline expansion joints.

3. Cast iron anchors shall be provided with stainless steel straps on piping, except where anchors form an integral part of pipe fittings and couplings or where an anchor of special design is required or shown on the Contract Drawings.

4. All pipe anchors, guides and restraints shall be designed to conform to ASME B31.1.

H. Expansion Joints and Flexible Couplings:

1. Supports, guides and anchors for flexible couplings and expansion joints shall be in accordance with the coupling and joint manufacturer's specification and the standards of the Expansion Joints Manufacturers Association.

I. Protection Saddles for Insulated Pipe:

1. Before placing the saddles, saddles shall be filled with either insulating cement or high density insulation cut to fit. For vapor barrier insulation, the barrier must be maintained; contact between hanger and support and bare pipe will not be permitted.

J. Adjustability:

1. Hangers and supports shall be capable of adjustment after placement of piping.

2. All points of adjustment for pipe and duct hanger rods shall be locked securely in place using double-nutting. Double-nutting means two nuts torqued directly against each other under each point of adjustment in addition to a third nut on top of the bracket. Damaging threads or tack welding as a method of locking adjustment is not permitted.

3. All threaded assemblies shall be double nutted or provided with pinned nuts. Alternately, tack welding of bolted assemblies may be acceptable unless provisions for vertical adjustment is required.

K. Any required pipe supports, for which the supports called for in this Section are not applicable, shall be fabricated or constructed from standard stainless steel shapes, concrete and anchor hardware, and shall be subject to the approval of Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Each pipe support system shall be tested in conjunction with the respective piping pressure tests.

1. Tests shall include cycling the piping system to duplicate operating conditions.

2. If any part of the pipe support system proves to be defective or inadequate, as evidenced by vibration or excessive movement, it shall be repaired or augmented at no additional cost to the City.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Touch-up shall be provided in the field, as required. Coating touchup shall be applied in accordance with the manufacturer's recommendations, and shall be free from spots and brush marks, to the satisfaction of the Engineer.

END OF SECTION

SECTION 40 05 22 – STEEL AND STAINLESS STEEL PROCESS PIPE
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. . The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all steel and stainless steel process pipe complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	5
1.06	Quality Assurance	6
1.07	Submittals	8
1.08	Delivery, Storage, and Handling	9
1.09	Spare Parts, Special Tools, and Supplies	9
1.10	Warranty	9
PART 2	PRODUCTS	10
2.01	Manufacturers	10
2.02	Materials / Equipment	10
2.03	Fabrication / Assembling / Finishes	21
2.04	Source Quality Control / Shop Tests	26
PART 3	EXECUTION	26
3.01	Examination / Preparation	26
3.02	Installation	27
3.03	Field Testing / Quality Control	27
3.04	Startup / Demonstration	27
3.05	Adjusting / Protection / Cleanup	27

C. Schedules:

1. Refer to the following Section(s) for additional information on the piping that is to be constructed using the pipe materials and methods specified herein:

   a. Section 40 06 01 - Schedule for Exposed Piping.

   b. Section 09 91 00 - Painting

   c. Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping

   d. Section 40 05 97 - Piping for Process Equipment.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 13.10 – Galvanizing.

B. Section 09 91 00 – Painting.

C. Section 40 05 05 – Exposed Piping Installation.

D. Section 40 05 06 – Couplings, Adapters, and Specials for Process Piping.

E. Section 40 05 07 – Hangers and Supports for Process Piping.

F. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1.	ANSI B16.9	-	Standard for Factory Made Wrought Steel Butt Welding Fittings
2.	ASTM A53	-	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
3.	ASTM A105/A105M	-	Forgings, Carbon Steel, for Piping Components
4.	ASTM A126	-	Gray Iron Castings for Valves, Flanges and Pipe Fittings
5.	ASTM A139	-	Electric-Fusion (ARC)-Welded Steel Pipe (NPS4 and Over)
6.	ASTM A193/A193M	-	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
7.	ASTM A197	-	Cupola Malleable Iron
8.	ASTM A240	-	Heat-Resisting Chromium and

			Chromium Nickel Stainless Steel plate, Sheet and Strip for Pressure Vessels
9.	ASTM A269	-	Seamless and Welded Austenitic Stainless Steel Tubing for General Service
10.	ASTM A276	-	Stainless and Heat-Resisting Steel Bars and Shapes
11.	ASTM A283/A283M	-	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
12.	ASTM A307	-	Carbon Steel Bolts and Studs, 50,000 psi Tensile
13.	ASTM A312/A312M	-	Seamless and Welded Austenitic Stainless Steel Pipes
14.	ASTM A380	-	Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
15.	ASTM A403/A403M	-	Wrought Austenitic Stainless Steel Piping Fittings
16.	ASTM A530	-	General Requirements for Specialized Carbon and Alloy Steel Pipe
17.	ASTM A774	-	As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures
18.	ASTM A778	-	Welded, Unannealed Austenitic Stainless Tubular Products
19.	ASTM B98	-	Copper Silicon Alloy Rod, Bar, and Shapes
20.	ASTM B117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus
21.	ASTM D714	-	Standard Test Method for Evaluating Degree of Blistering of Paints (Fog) Apparatus
22.	ASTM E96	-	Standard Test Method for Gravimetric

			Determination of water Vapor Transmission Rate of Materials
23.	ASTM F491	-	Specification for Poly (Vinylidene Fluoride) (PVDF) Plastic-Lined Ferrous Metal Pipe and Fittings
24.	ASTM F492	-	Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings
25.	ASTM F599	-	Specification for Poly (Vinylidene Chloride) (PVDC) Plastic-Lined Ferrous Metal Pipe and Fittings
26.	ASTM G22	-	Antibacterial Test
27.	ASTM G95	-	Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)
28.	ASME B1.1	-	Unified Inch Screw Threads (UN and UNR Thread Form)
29.	ASME B16.1	-	Cast Iron Flanges and Flanged Fittings, Class 25, 125, 250, 800
30.	ASME B16.3	-	Malleable-Iron Screwed Fittings, Classes 150 and 300.
31.	ASME B16.4	-	Gray Iron Threaded Fittings Classes 125 and 250
32.	ASME B16.5	-	Pipe Flanges and Flanged Fittings
33.	ASME B16.9	-	Factory-Made Wrought Buttwelding Fittings
34.	ASME B16.11	-	Forged Fittings, Socket-Welding and Threaded
35.	ASME B16.21	-	Non-Metallic Gaskets for Pipe Flanges
36.	ASME B18.2.1	-	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
37.	ASME B31.1	-	Power Piping

38.	ASME B36.19M	-	Stainless Steel Pipe
39.	AWWA C200	-	Steel Water Pipe 6-in. and Larger
40.	AWWA C203	-	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines Enamel and Tape Hot-Applied
41.	AWWA C205	-	Cement-Mortar Protective Lining and Coating for Steel Water Pipe 4-in. and Larger - Shop Applied
42.	AWWA C207	-	Steel Pipe Flanges for Waterworks Service Size 4-in. Through 144-in.
43.	AWWA C210	-	Liquid Epoxy Coating Systems for Interior and Exterior of Steel Water Pipelines
44.	AWWA C214	-	Tape Coating Systems for the Exterior of Steel Water Pipelines.
45.	AWWA M11	-	Steel Pipe A Guide for Design and Installation
46.	CEN-EN-598	-	Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods
47.	ISO 14025	-	Environmental labels and declarations Type III environmental declarations
48.	NSF 61	-	Drinking Water System Components Health Effects
49.	New York City Building Code		

1.05 DESCRIPTION

A. This Section includes requirements for providing steel and stainless steel process pipe and accessories in accordance with applicable standards and regulations. In addition:

1. The scope of this Section shall include all steel and stainless steel process pipe, fittings, and specials.

2. The extent of steel and stainless steel process piping is shown on the Contract Drawings. Steel and stainless steel process pipe service, pipe diameter, material, coating, pressure rating, joint type, and testing requirements are specified in the following section(s):

a. Section 40 06 01 - Schedule for Exposed Piping.

3. Steel and stainless steel process pipe, fittings, appurtenances, and specials shall be furnished and installed complete with all necessary jointing materials, wall castings, wall sleeves, specials, adapters, and other appurtenances as shown on the Contract Drawings, as specified herein, and/or as necessary and required for a complete installation.

   a. Couplings for steel and stainless steel process pipe shall be provided as specified in Section 40 05 06 - Couplings, Adapters, and Specials for Process piping.

   b. Hangers and support for steel and stainless steel process pipe shall be provided as specified in Section 40 05 07 - Hangers and Supports for Process Piping.

4. Where shown on the Contract Drawings, the Contractor shall provide all labor and materials for making connections between steel and stainless steel process pipe and existing lines(s) installed under other contracts, including all specials required to connect steel and stainless steel process pipe to pipe of dissimilar material(s).

5. The scope of this Section shall include all painting, coating, lining, gaskets, harnesses, bolts, nuts, and other appurtenances and material required to provide and assemble the lines.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include but are not limited to the following activities:

   a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

   b. Perform visual inspection of welding, as per applicable welding code if applicable.

   c. Perform visual and dimensional inspection of completed work.

B. Qualifications of Manufacturer:

1. The manufacturer shall have a minimum of five (5) years of experience in the design and fabrication of steel and stainless steel process pipe, fittings, appurtenances, and specials of similar size, capacity, and type to those shown on the Contract Drawings and specified in the Contract Documents, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

2. Linings and coatings:

   a. Lining and coating manufacturer shall have a minimum of five (5) years of experience in protecting pipelines exposed to the service conditions specified in the Contract documents, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

3. Qualifications of Welder:

   a. Certified welders, having current certificates conforming to the requirements of the ASME code, shall be utilized to perform all welding on steel pipes. Welders shall be qualified under the requirements of Section IX Welding Qualifications of the ASME Boiler and Pressure Vessel Code.

C. Supply and Compatibility:

1. All steel and stainless steel process pipe, fittings, appurtenances, and specials included in this Section shall be provided by the Contractor through a single, qualified steel and stainless steel process pipe manufacturer

2. The pipe and fittings shall be designed, fabricated, and installed in accordance with the standards referenced herein.

3. The manufacturer shall bear responsibility for the quality of all factory-applied linings and coatings, regardless of the location of application.

4. The manufacturer shall verify compatibility between the steel and stainless steel process pipe, fittings, appurtenances, specials, and other Work.

5. Inscription:

   a. The following shall all be shall be rolled or permanently inscribed on each and every pipe surface:

      1) manufacturer's name or trademark,

      2) the year of manufacture and

      3) the ASTM or API specification number.

   b. As an alternate to rolling or permanent inscription, the information required herein may be stenciled on each and every pipe surface.

   c. Pipe 1½ in. and less in nominal diameter shall be bundled and tagged.

6. Foreign products and materials:

a. Steel and stainless steel pipe and fittings manufactured outside of the continental United States shall meet all the requirements of the latest ASTM standards referred to hereinbefore and, unless waived in writing by the City, shall undergo physical tests and chemical analyses to prove compliance therewith.

1) Such tests and analyses shall be performed by an independent testing laboratory approved by the City.

2) If the testing laboratory is located outside the United States, then the Contractor shall pay all costs for two DEP personnel to witness such tests.

3) The test samples shall be selected and tested in conformance with ASTM requirements.

4) The City may at its discretion visit the test facility and witness the tests.

5) The cost of all physical tests and chemical analyses shall be borne by the Contractor.

D. Regulatory Requirements:

1. Steel and stainless steel process pipe shall conform to the applicable provisions of the Code for Pressure Piping, ASME B31.1 and its Supplements and specifically to Chapters 2, 4, and 5 of Section 6 - Fabrication Details except for plumbing and low pressure (15 psig maximum) heating lines.

2. Steel and stainless steel process pipe and fittings shall conform to the New York City Building Code in respect to plumbing and other applications covered by these codes.

3. Use only NSF61-approved materials in potable water lines.

1.07 SUBMITTALS

A. Submittals for all steel and stainless steel process pipe shall comply with the requirements of Section 40 05 05 - Exposed Piping Installation.

B. For steel pipe 48-in. and larger, submit measurements for all plate thicknesses in an editable spreadsheet.

C. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new

materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Pipes shall be loaded on properly padded saddles not less than 6-in. in width so that they do not bear against each other.

2. The whole load shall be securely fastened together as well as to any vehicle to prevent movement in transit.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Special care in handling shall be exercised during delivery, storage and handling of pipe to avoid damage and setting up stresses. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

2. When required for maintaining its circular shape and preventing distortion, each length of pipe shall be temporarily braced with an approved type of internal spider in each end of the pipe during erection.

3. Handling Coated Pipe:

a. Coated pipe shall be protected at all times and handled with equipment designed to prevent damage to the coating, such as stout wide canvas slings and wide padded skids.

1) The use of bare chains, cables, hooks, metal bars or narrow skids in contact with the coating will not be permitted.

b. All pipe handling and hauling equipment shall meet the approval of the Engineer before use.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ceramic Epoxy Lining:

1. Ceramapure PL 90, as manufactured by Induron Protective Coatings, Birmingham, AL.

2. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Steel Pipe:

1. Wall thicknesses for steel pipe shall be in accordance with ASME B36.10M and as specified in Table 40 05 22-1:

TABLE 40 05 22-1
WALL THICKNESS FOR STEEL PIPE

Nominal Pipe Diameter: (in.)	Schedule/ Thickness:	Shall comply with the following additional standards:
≤ 12	Sch. 40	ASTM A53
14 - 24	⅜ in.	ASTM A53
30	⅜ in.	ASTM A139
≥ 36	½ in.	ASTM A139

2. Steel pipe 30-in. in diameter and larger may be in accordance with the requirements of AWWA C200 and fabricated of plates meeting the requirements of ASTM A283/A283M Grade D, fusion welded in accordance with the Code for Pressure Piping, ASME B31.1, so as to develop full plate strength. Such fabricated steel pipe shall be shop tested as specified for fabricated fittings.

a. Pipe shall be fabricated with straight-seam welds or spiral-seam welds.

b. Welds shall be provided with a smooth uniform cross section to provide pipe with a neat external appearance.

c. Pipe shall be fabricated with not more than two longitudinal seams and with girth seams not less than 7 ft apart.

d. The pipe and fitting diameters of 30-in. and larger, as shown or specified, are inside diameters.

3. Carbon steel pipe, including fabricated pipe shall be provided in lengths of approximately 20 ft unless otherwise specified.

4. Ultrasonic Thickness Measurement:

   a. All pipe 48-in. diameter and larger fabricated from plate, shall have the thickness of each component plate (carbon and stainless steel) measured in accordance with ASTM E797 and recorded by the Contractor.

   b. Thickness readings shall be taken by the manufacturer at the mill at 16 equally spaced points on each plate as to represent the entire plate. Repeat readings for each component plate in the pipe.

   c. Each and all individual readings, not the average, shall meet the minimum thickness. Pipe with plate having any reading less than the thickness shall be rejected.

   d. A thickness chart shall be submitted to the Engineer, in an editable spreadsheet, detailing all the plate thicknesses.

   e. Plate may not proceed to rolling until measurements are approved.

B. Steel Fittings:

1. General:

   a. Fittings shall be manufactured to standard dimensions, suitable for the pressures specified.

   b. Fittings shall be provided of the same or heavier wall thickness as the pipe of which they are a part.

   c. Strength, physical and chemical requirements, shall meet or exceed the requirements specified for the pipe.

2. Fittings used in pipelines 2-in. diameter or smaller shall be of the screwed pattern, except as shown or specified otherwise.

3. Fittings used in pipelines 2½-in. diameter or larger shall be of the seamless steel welded type or flanged type, except as shown or specified otherwise.

4. Unions:

   a. Screwed unions shall be used on all steel pipelines 2-in. diameter and smaller.

   b. An adequate number of unions of the screwed or flanged type shall be provided in each main pipe and each branch to facilitate the dismantling or removal of any branch line or any part thereof or the section of the main pipe to which it connects, without disturbing adjacent branch lines or their related main pipeline.

   c. Where sleeve-type (harnessed) groove-type or shouldered-end flexible pipe couplings, are specified, they may be considered as substitutes for pipe unions.

5. Screwed Fittings:

   a. Screwed fittings 2-in. and smaller shall be malleable iron flat band fittings, ASME B16.3, Class 150. For high pressure service, conform to ASME B16.3, Class 300. Malleable iron shall conform to the requirements of ASTM A197.

   b. Where shown or specified, screwed end fittings of cast iron, conforming to the requirements of ASME B16.4, Class 125 standards for general service and Class 250 for high pressure service shall be provided. Cast iron shall meet the requirements of ASTM A126.

   c. All threads shall be clean cut and smooth conforming to the American Standard for Pipe Threads, ASME B1.1. Fittings shall be with right and/or left hand threads as required.

   d. Unions and railroad unions and union elbows and tees shall be malleable iron fitted with brass to iron seats unless otherwise specified.

6. Socket Welding Fittings:

   a. Where shown or specified, steel socket welding fittings shall be provided on 3-in. and smaller services for high pressure gas, oil or where otherwise shown. Steel socket fittings shall conform to the requirements of ASME B16.11 with steel conforming to ASTM A105/A105M, Grade 2. Fittings shall be rated at Class 2000 (minimum).

   b. Socket welding fittings shall be welded in conformity with the applicable provisions of the Code for Pressure Piping, ASME B31.1.

7. Butt Welding Fittings:

   a. Butt welding fittings shall meet the requirements of ASME B16.9.

   b. Outlets for welded connections that are made with welded half coupling shall be of the butt welding type.

   c. Outlets for threaded connections shall be made with threaded half couplings.

   d. Where welding fittings are approved for assembly in the cement lined pipelines, fittings shall be provided with a plain end, grooved end or shouldered end section welded on each end of the fitting and assembled with sleeve-type, groove-type or shouldered-end couplings as required. Long tangent welding fittings may be submitted for approval as a substitute for welded-on spool piece fittings provided that they can accommodate flexible pipe couplings.

8. Flanged Fittings:

a. Where shown on the Contract Drawings or where specified, cast iron or steel flanged fittings shall be provided.

b. Cast iron flanged fittings for general service shall conform to the requirements of ASME B16.1.

c. Steel flanged fittings shall utilize forged steel slip-on flanges. Fittings shall be Class 125 and Class 250 fittings conforming to the requirements of ASME B16.5, Class 150 or Class 300, respectively, as specified, except flanges that are plain faced shall be provided. Provide Class 125 fittings conforming to AWWA C207, Class B.

d. Cast steel flanged fittings shall be assembled with forged steel flanges of the same pressure rating, conforming to the requirements of ASME B16.5.

C. Fabricated Steel Fittings:

1. Unless otherwise shown or specified, fittings 24-in. and larger shall be fabricated in accordance with the Code for Pressure Piping, ASME B31.1 and the requirements specified hereinafter.

2. Fittings shall be shop fabricated from a segmental welded steel section of a plate thickness not less than that specified for pipe connected thereto. The minimum radii of the centerlines of the bends shall be 1.5 times the nominal pipe diameter unless otherwise specifically shown on the Contract Drawings. The included angle between the points of tangency of the bend and connecting straight pipe shall contain not less than the number of bend segments called for in Table 40 05 22-2:

TABLE 40 05 22-2
MINIMUM NUMBER OF EGMENTS FOR FABRICATED STEEL FITTINGS

Bend Angle:	Minimum No. of Full Segments:	Minimum No. of Part Segments:
75° - 90°	4	2
60° - 74°	3	2
45° - 59°	2	2
30° - 44°	1	2
0° - 29°	0	2

a. In Table 40 05 22-2:

1) Full segments shall consist of sections with ends cut to form included angles of 15°.

2) Part segments shall consist of sections up to 7½°.

3) Depending on the angle, additional full segments may be required beyond the minimum number specified in Table 40 05 22-2 to make the bend angle.

b. The following examples are offered demonstrating conformance to table 40 05 22-2:

1) A 90° bend would require four (4) 15° full segments, two (2) 7½° segments at the ends of the fitting, plus one (1) additional 15° segment to make 90°. The additional 15° (full) segment is required to make an angle of 90°.

2) A 45° bend would require two (1) 15° segments and two (2) 7½° segments.

3. Fittings for cement-lined pipelines shall be lined after fabrication of the fittings.

4. Cement-lined fabricated fittings shall be installed with flexible pipe couplings. Such fittings shall be provided with extra-long end segments extending past the point of tangency of the radius to the segment centerline to accommodate the couplings.

5. Fabricated fittings installed with couplings shall be provided with extra-long end pieces to suit the coupling. Sleeve-type or shouldered-end couplings provided shall meet the requirements of Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping. Collared end pieces shall be provided for shouldered-end couplings.

6. Reducers and increasers shall be provided with the same laying length as American Standard Class 125.

7. Fabricated steel fittings shall be provided with plain ends or welded flanges.

8. Tees, wyes, laterals and outlets shall be reinforced in accordance with AWWA Manual M11.

D. Flanges And Flanged Joints:

1. Flanges: Unless otherwise shown, all flanges for steel pipe, except blind flanges shall be of the slip-on welding type with hubs meeting the requirements of ASME B16.5. Where specifically captioned on the Contract Drawings or where explicitly required by the Contract Documents, furnish and install steel pipe flanges complying with AWWA Standard C207 as required. Welding neck steel flanges, ASME B16.5, may be submitted to the Engineer for approval in place of slip-on flanges.

a. Slip-on flanges shall be welded to the steel pipe at the hub and at the pipe end in conformity with the Code for Pressure Piping, ASME B31.1 Section 6.

b. Plain faced blind flanges in accordance with ASME B16.5 shall be provided.

c. Standard raised faces flanges shall be provided for the sizes specified except for cast iron-to-steel joints which shall be plain faced.

d. Steel Class 150 welding flanges shall be used for assembly with Class 125 cast iron flanged fittings, steel Class 300 flanges with Class 250 cast iron flanged fittings, and AWWA Class B steel hub flanges with Class 25 cast iron flanged fittings.

2. Flanged Joints: Flanged joints shall be made with bolts or bolt studs with a nut on each end. Stud bolts shall be used for all bolting sizes 1¾-in. and larger.

a. Bolts, stud bolts, and nuts shall meet the requirements of ASTM A307 Grade B, except for high temperature service where alloy steel bolts, ASTM A193/A193M, Grade B5, shall be used. Bolts and stud bolts shall conform to the dimensional requirements of ASME B18.2.1 with rolled threads conforming to ASME B1.1, Coarse Series, Class 2 fit. Bolts and stud bolts and nuts shall be of American Standard heavy unfinished hexagonal type.

b. On sludge lines requiring disassembly for cleaning and where otherwise shown or specified, bolts and nuts shall be of silicon bronze, ASTM B98, Alloy A, with sizes and dimensions equal to steel bolts and nuts.

c. Bolts shall be provided with a ¼-in. projection beyond the nut when joint with gasket is assembled.

3. Gaskets: Ring type gaskets shall be provided for pipe larger than 12-in. in diameter, and full face gaskets for pipe sizes 12-in. in diameter and smaller with dimensions in conformity with the requirements of ASME B16.21, unless specified otherwise. Gaskets shall be as thin as the finish and accuracy of the surfaces will permit.

a. For general service, rubber gaskets shall be ⅛-in. thick and meet the requirements of AWWA C207 as modified and supplemented herein.

b. Gasket material which is provided shall be specifically recommended for the service by the gasket manufacturer and as approved by the Engineer.

4. Insulation: Insulated flanged joints shall be provided as required. Flange insulation kits shall include flange insulating gasket, flange bolt insulating sleeves, and flange bolt insulating washers.

E. Couplings:

1. Where shown on the Contract Drawings, specified, or required for the convenience of installation, pipe couplings conforming to the requirements

of Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping, shall be furnished and installed.

2. Harnessed sleeve-type couplings shall be used close to the connecting point for pipe connections to pumps and other equipment handling fluids or gases under 200°F susceptible to damage or binding due to pipe strain unless other types of flexible connections are shown or specified.

3. Cement-lined fabricated fittings shall be assembled with flexible pipe couplings. Where butt welding fittings are approved for assembly in cement lined pipes, fittings shall be provided with spool pieces welded on each end and, assembled with flexible pipe couplings after cement lining. Where harnessed joints are required on lined pipe, the harnessing lugs shall be welded before lining.

4. Where pipelines pass from a concrete structure into earth, flexible couplings shall be installed at the face of the structure and at a point about four feet from the structure to protect the pipe against damage by displacement or settling.

F. Expansion Joints:

1. Where shown on the Contract Drawings, specified, or required, the Contractor shall provide internally guided, packed sleeve type expansion joints, in which the traverse slip section functions correctly without leakage at the maximum estimated expanded position at full operating pressure.

2. Unless specified otherwise, on pipes 3-in. nominal diameter and smaller, expansion joints with screwed ends, of all bronze or brass construction shall be provided.

3. On pipelines 4-in. and larger, expansion joints with ANSI Class 125 flanged ends, cast semi-steel bodies and brass sleeves shall be provided.

4. Ample space shall be provided for packing, with packing material suitable for the service and pressure specified. Where specified or shown, integrally cast anchor bases suitable for anchor bolting shall be provided.

5. Expansion joints shall be installed so that the traverse can move only in a direction parallel to its center line in conformity with the requirements of the Code for Pressure Piping, ASME B31.1, Paragraph 612.

G. Wall Sleeves:

1. Suitable ductile iron or steel pipe sleeves shall be provided at all points where pipes pass through the walls or floors of structures, and where wall castings are not provided.

   a. Ductile iron sleeves shall be provided as specified in Section 40 05 19, Ductile Iron Process Pipe.

2. Steel sleeves 12-in. in diameter and larger shall be provided with a minimum wall thickness of 0.375-in.. Steel sleeves smaller than 12-in. in

diameter shall be provided not less than Schedule 40. Steel sleeves shall be provided with an intermediate collar located at the center of the wall. The O.D. of the collar shall be four inches greater than the O.D. of the sleeve, fabricated from steel plate with a minimum thickness equal to the sleeve thickness and double welded to the sleeve.

3. Modular mechanical-type seals consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall sleeve shall be provided. The elastomeric element shall be of the size, quantity, type and material that the manufacturer recommends for the intended service and that will provide an effective hydrostatic seal.

H. Cleanouts:

1. Where shown on the Contract Drawings or specified, flanged cleanouts shall be provided as specified in Section 40 05 19, Ductile Iron Process Pipe.

I. Stainless Steel Pipe and Fittings For Low Pressure Air Service:

1. General:

a. Low pressure air service pipe is limited to air lines with a maximum working pressure of 15.0 psig.

b. For air piping nominal pipe sizes 3-in. and above shall be fabricated in accordance with ASTM A778 from Type 316L stainless steel.

c. The pipe shall be subjected to hydrostatic and flattening tests as specified in ASTM A530.

d. All welds shall be free from burrs, snags or rough projections.

2. Wall Thickness:

a. Wall thicknesses for stainless steel pipe for low pressure service shall be as specified in Table 40 05 22-3, unless a greater wall thickness is specified in the following piping schedule:

1) Section 40 06 01 - Schedule for Exposed Piping.

TABLE 40 05 22-3
WALL THICKNESS FOR STAINLESS STEEL PIPE FOR LOW PRESSURE SERVICE

Nominal Pipe Diameter: (in.)	**Schedule/ Thickness:**	**Shall comply with the following additional standards:**
≤ 18	Sch. 10S	ANSI B36.19
20 - 36	$^{3}/_{16}$-in.	N/A
42 - 48	¼-in.	N/A
54 - 60	$^{5}/_{16}$-in.	N/A
66 - 72	⅜-in.	N/A

Nominal Pipe Diameter: (in.)	Schedule/ Thickness:	Shall comply with the following additional standards:
78 - 96	½-in.	N/A

3. Joints:
   a. Joints for low pressure air service shall be butt weld or flanged only – pipe couplings for joining plain end, grooved end, and shouldered end pipe and fittings are not acceptable.
   b. No welding in the field shall be permitted.
4. Fittings:
   a. General:
      1) Fittings shall be manufactured to standard dimensions and suitable for the pressures specified.
      2) Fittings shall be provided of the same or heavier wall thickness as the pipe of which they are a part.
      3) Strength, physical and chemical requirements, shall meet or exceed the requirements specified for the pipe.
      4) Fittings shall be subject to the same hydrostatic test as the pipe.
   b. Materials and Construction:
      1) Fittings shall be fabricated from Type 316L stainless steel in conformance with ASTM A774 of the same wall thickness as specified for the pipe.
      2) Fittings shall conform to the dimensional requirements of ANSI B16.9, Standard for Factory Made Wrought Steel Butt Welding Fittings.
         a) Elbows shall be long radius.
   c. Flanged Ends:
      1) Where shown on the Contract Drawings or where specified, stainless steel flanged fittings shall be provided.
      2) Flanged pipe ends shall be made up of 316L stainless steel slip-on type rolled angle face rings and 316 stainless steel back-up flanges drilled to ANSI 16.1 class 125 standard.
      3) The angle face ring thickness shall be equal to or greater than the wall of the pipe or fitting to which it is welded and it shall be continuously welded on both sides to the pipe or fitting.

4) Van stone style flanges are not acceptable for low pressure air service.

5) The angle leg shall not interfere with the flange bolt holes.

6) The backup flanges shall be supplied per ASTM A240 with thicknesses specified in Table 40 05 22-4.

TABLE 40 05 22-4
BACKUP FLANGE THICKNESS FOR STAINLESS STEEL PIPE FOR LOW PRESSURE SERVICE

Nominal Pipe Diameter: (in.)	**Flange Thickness (in.)**
2½ - 3	½
4	9/16
6 - 10	⅝
12 - 16	¾
18 - 20	⅞
24 - 30	1
36	1⅛
42	1¼
48	1⅜
54	1⅜
60	1½
66	1⅝
72	1⅝
84	1¾
96	2

d. Gaskets shall be rated for 250°F service.

5. All stainless steel pipe and fittings shall be pre-cleaned, pickled and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

J. Heavy Wall Stainless Steel Pipe and Fittings:

1. Heavy wall stainless steel pipe and fittings shall be Type 316L stainless steel fabricated in accordance with ASTM A312/312M for nominal pipe sizes up to 12-in.

2. Wall thickness shall be Schedules 40S or 80S pipe in accordance with ANSI B36.19 and as indicated on the piping schedule in the Contract Documents.

3. Flanges:

   a. Where flanges are shown, specified or required for connection of stainless steel pipe and fittings to pipe equipment, forged stainless steel slip-on flanges conforming to ANSI 150 pound or 300 pound standards, shall be provided as specified, welded at the hub and at the face.

   b. Flanges, flanged fittings and flanged joints shall conform to the applicable provisions specified herein for steel flanges, flanged fittings and flanged joints, except that steel bolting shall be cadmium plated to produce a uniform appearance.

4. Fittings:

   a. For nominal pipe sizes 2½-in. and larger: Fittings shall be the butt-welding type conforming to the dimensional requirements of ASME B16.9.

5. All stainless steel pipe and fittings shall be pre-cleaned, pickled and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

K. Stainless Steel Tubing and Fittings:

1. Tubing and fittings shall be of Type 316L stainless steel.

2. Tubing shall be seamless.

3. Tubing shall be in accordance with ASTM A269 for nominal tubing diameters less than 1½-in..

4. Wall Thickness and Service:

   a. Tubing shall be as specified in Table 40 05 22-5:

TABLE 40 05 22-5
WALL THICKNESS AND PRESSURE RATING FOR STAINLESS STEEL TUBING AND FITTINGS

Nominal Tubing Diameter: (in.)	Wall Thickness: (in.)	Pressure Rating: (psi)
¼	0.035	3,000
⅜	0.035	2,500
½	0.049	2,500
⅝	0.049	2,500
¾	0.065	2,500

Nominal Tubing Diameter: (in.)	Wall Thickness: (in.)	Pressure Rating: (psi)
1	0.065	2,000

b. Provide Type 316 stainless steel, flareless tube fittings in conformance with ASTM A276.

c. Provide dielectric insulating joints or fittings at connections between exterior piping and interior piping.

d. All stainless steel tubing shall be pre-cleaned, pickled, and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Coatings and Linings:

1. General:

a. Steel and stainless steel process pipe shall be lined and coated in accordance with the piping schedule(s) included in the following Section(s):

1) .

2) Section 40 06 01 - Schedule for Exposed Piping.

b. All bolts, nuts, couplings and the like shall be coated after the joint has been made.

c. Painting shall be in accordance with Section 09 91 00 - Painting.

d. Pipe and fittings that are to be encased in concrete shall not be painted.

e. For all steel double-grooved flanges and plain face flanges that seal against a double-grooved flange, apart from stainless steel, the flange faces shall be coated with an NSF-61-approved food-grade oil or grease-like corrosion inhibitor. The protective coating shall be continuously maintained after fabrication and during storage. Before assembly, the corrosion inhibitor shall be removed from the flanges according to the lubricant manufacturer's instructions.

2. Tape Coating:

a. Where shown, specified, or required for exterior coating of buried piping multi-layered, cold-applied tape in accordance with AWWA C214 shall be provided.

3. Liquid Epoxy:

a. Where liquid epoxy lining and coating is shown, specified or required, lining and coating shall be in accordance with AWWA C210, at twice the standard thickness.

4. Cement-Mortar Lining:

a. The pipe and fittings shall be lined before installation in conformity with the requirements of AWWA C205. The lining shall be shop applied. A seal of asphaltic material shall be provided in conformity with AWWA C203.

b. Fabricated pipe and fittings shall be cement lined after fabrication.

c. Cement linings for steel pipe and fittings shall conform to the thicknesses as given in AWWA C205 and Table 40 05 22-6:

TABLE 40 05 22-6
CEMENT LINING THICKNESS AND TOLERANCES

Nominal Pipe Size: (in.)	Lining Thickness (in.)	Tolerance (in.)
1¼ - 1½	$^{3}/_{32}$	$\pm^{1}/_{64}$
2 - 2½	$^{1}/_{8}$	$\pm^{1}/_{32}$
3 - 3½	$^{5}/_{32}$	$\pm^{1}/_{32}$

d. Shop and field cutting of cement lined pipe will be permitted only by methods specifically approved by the Engineer, in each case; field cutting will only be permitted if witnessed by the Engineer.

e. Caps, plugs, sleeves and valve box castings shall not be cement lined but shall receive a liquid epoxy coating as specified under Paragraph C above.

5. Ceramic Epoxy Lining:

a. Lining applicator:

1) Lining shall be applied by a certified firm or manufacturer with a successful history of applying linings to the interior of steel pipe and fittings.

2) Manufacturer must be independently inspected at least two (2) times per year with certification stating compliance with the requirements specified herein.

b. Lining materials: Amine cured novolac epoxy containing at least 20% by volume of ceramic quartz pigment, and shall have:

1) A permeability rating of 0.00 as per Method A of ASTM E96, Procedure A (test duration of 30 days).

2) Results equal to 0.0 undercutting after two years as per ASTM B 117.

3) Results to equal no more than 0.5mm undercutting after 30 days as per ASTM G 95 cathodic disbondment 1.5 volts at 77°F.

4) Immersion testing rated using ASTM D 714, with the following results after two years' duration testing of:

a) 20% Sulfuric acid: No effect.

b) 140°F 25% Sodium Hydroxide: No effect.

c) 160°F Distilled Water: No effect.

d) 120°F Tap Water (scribed panel): 0.0 undercutting with no effect.

5) Results of only trace growth using ASTM G 22 at 30°C after 7 days.

6) An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598, Section 7.8.

c. Application:

1) Condition of pipe prior to application: Prior to application of the ceramic epoxy lining:

a) Interior: No other coating or lining shall have been applied to the entire interior of the pipe.

b) Exterior: No other coating or lining shall have been applied to the first six inches of the exterior of the spigot ends.

2) Surface preparation:

a) Inspect application area for oil, grease, etc. prior to abrasive blasting. Solvent clean if necessary or required for coating application.

b) Abrasive blast application area using sand or grit abrasive media to remove all rust, loose oxides, etc. Only slight stains and tightly adhering oxide shall remain on application surface. If rust reappears before application, or if more than 8hrs elapses before application, repeat blasting procedure specified herein.

3) Lining:

a) Pipe shall be lined within 8 hours of surface preparation.

b) Apply 20 mils nominal dry film thickness to interior of pipe.

c) Lining shall not take place when the substrate or ambient temperature is below 40°F or over 120°F.

d) Ensure surface is dry and dust free.

e) Do not apply lining to flange faces.

f) The substrate temperature must be 5°F above the dewpoint for a period of at least 2h after application to avoid condensation occurring on wet coating. Do not apply over wet or frozen surfaces.

4) Coating of Bell Sockets and Spigot Ends

a) Apply joint compound as per Manufacturer's instructions to the gasket area and spigot end up to 6 in. back from the end of the spigot end.

b) Apply 6 mils nominal, 10 mils maximum even coverage.

c) Manufacturer's joint compound shall be applied by brush to ensure full and complete coverage.

d) Care should be taken that the joint compound is smooth without excess buildup in the gasket seat or on the spigot ends.

e) Coating of the gasket seat and spigot ends shall be done after the application of the lining.

f) The interior of the bell shall be lined with 20 mils minimum and 25 mils maximum.

5) Lining of Welded Steel Pipe Joints

a) All welded steel pipe shall be lined as indicated with 20 mils dry film thickness minimum.

b) Each joint of pipe shall have the last 3-in. of the interior taped prior to lining to allow for bare pipe at the welded joints.

c) The interior of all pipe joints must be seal welded with no voids.

d) After the joints are welded and prior to placing the pipe in service, the welded joints and any adjacent areas shall be prepared to achieve a level of cleanliness equal.

(1) This will include a thorough cleaning to remove any weld smoke, anti-splatter, oil

deposited on the surface or other foreign contamination.

e) The finished joint application shall be a minimum of 20 mils dry film thickness.

f) All joint repairs shall be performed as indicated by the specification including pinhole detection and inspected independent of the contractor to ensure compliance with the specification.

g) Holiday detection and inspection independent of the contractor shall insure compliance with the specification resulting in a finished, continuous lining equal in all respects to the original lining, as outlined in this specification.

6) Number of Coats

a) The number of coats of lining material applied shall be as recommended by the lining manufacturer.

b) In no case shall lining material be applied above the dry thickness per coat recommended by Manufacturer in printed literature.

c) The maximum or minimum time between coats shall be that time recommended by Manufacturer.

d) To prevent delamination between coats, no material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.

7) Touch-Up and Repair

a) Use Manufacturer's joint compound for touch-up or repair in accordance with Manufacturer instructions.

d. Inspection:

1) All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge as per SSPC PA-2.

2) Test interior of all pipe and fittings for pinholes with a nondestructive 2500-volt test in accordance with ASTM D5162. Any defects found shall be repaired and re-inspected prior to shipment.

e. Mark each pipe joint and fitting with the date of application of the lining system along with its numerical sequence of application on that date. Numerical sequence shall correspond to records maintained by the applicator.

6. Exterior Primer:

   a. Pipe and fittings shall be shop coated on the outside in accordance with Section 09 91 00, Painting, for use in exposed locations, such as inside buildings where finish painting or insulating is required.

7. Painting:

   a. Pipe and fittings shall be painted in accordance with the requirements of Section 09 91 00, Painting.

8. Galvanizing:

   a. Galvanizing shall be provided in accordance with ASTM A53.

9. Coating Exposed Threads of Buried Galvanized Pipe:

   a. Where galvanized pipe is buried underground and joined by means of screwed fittings, a protective zinc dust coating in accordance with Section 05 05 13.10, Galvanizing, shall be applied to the exposed threads in the field.

   b. Do not leave any exposed metal uncoated.

10. Urethane Coating:

   a. Urethane coating shall be provided in accordance with Section 09 91 00, Painting, where shown, specified or required.

11. Plastic-Lined Steel Piping:

   a. Polyvinylidene chloride (PVDC) lined steel pipe and fittings meeting the requirements of ASTM F599, shall be provided where shown or specified, except PVDC liner shall have a minimum elongation at yield of 5 percent.

   b. Type I polypropylene lined steel pipe and fittings meeting the requirements of ASTM F492 shall be provided where shown or specified.

   c. Polyvinylidene fluoride (PVDF) lined steel pipe and fittings meeting the requirements of ASTM F491 shall be provided where shown or specified.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Damaged pipe will be rejected and shall be replaced at the Contractor's expense.

3.02 INSTALLATION

A. Install steel and stainless-steel process pipe, fittings, and specials in accordance with the requirements of the following Section(s):

1. Section 40 05 05 - Exposed Piping Installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Perform field testing and quality control of ductile iron process pipe, fittings, and specials in accordance with the requirements of the following Section(s):

1. Section 40 05 05 - Exposed Piping Installation.

B. Perform field testing and quality control of stainless steel pipes as follows:

1. Steel and Stainless Steel Piping shall be tested as stipulated by Section 40 05 05.30

3.04 STARTUP / DEMONSTRATION

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning:

1. During construction, all piping shall be thoroughly cleaned before placement and the lines kept free from foreign matter of whatever origin. The pipes shall be left thoroughly clean to the satisfaction of the Engineer.

2. Flush all process and potable water pipelines with clean water.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 53 – PROCESS VALVES TWENTY-FOUR-INCH DIAMETER AND SMALLER
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish, install, and test all process valves 24-inch diameter and smaller complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	4
1.06	Quality Assurance	4
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	8
PART 2	PRODUCTS	8
2.01	Manufacturers	8
2.02	Materials / Equipment	11
2.03	Fabrication / Assembling / Finishes	67
2.04	Source Quality Control / Shop Tests	70
PART 3	EXECUTION	73
3.01	Examination / Preparation	73
3.02	Installation	73
3.03	Field Testing / Quality Control	74
3.04	Startup / Demonstration	74
3.05	Adjusting / Protection / Cleanup	74

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 23.01 – Welding.

B. Section 09 91 00 – Painting.

C. Section 40 05 97 – Identification for Process Equipment.

D. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	NRS	Non-Rising-Stem.
2.	OS&Y	Outside Screw and Yoke.
3.	FS	Federal Specification

B. Definitions:

1.	Non-ferrous metals:	All metal mixtures including copper, tin, zinc, lead, and/or other metals, in which iron does not predominate.

C. Reference Standards:

1.	ASME B16.1	Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125 and 250.
2.	ASME B16.34	Valves-Flanged, Threaded, and Welding End.
3.	API 594	Check Valves: Flanged, Lug, Wafer and Butt-welding.
4.	API 598	Valve Inspection and Testing.
5.	API 609	Butterfly Valves: Double-flanged, Lug- and Wafer-type.
6.	ASTM A126	Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
7.	ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
8.	ASTM A194	Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
9.	ASTM A240	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
10.	ASTM A276	Standard Specification for Stainless Steel Bars and Shapes.

11.	ASTM A351	Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
12.	ASTM A380	Standard Specification for Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.
13.	ASTM A536	Standard Specification for Ductile Iron Castings.
14.	ASTM A564	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
15.	ASTM A743	Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
16.	ASTM B62	Standard Specification for Composition Bronze or Ounce Metal Castings.
17.	ASTM B138	Standard Specification for Manganese Bronze Rod, Bar and Shapes.
18.	ASTM B164	Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.
19.	ASTM B265	Standard Specification for Titanium and Titanium Alloy Strip, Sheet, and Plate.
20.	AWWA C500	Metal-Seated Gate Valves for Water Supply Service.
21.	AWWA C501	Cast-Iron Sluice Gates.
22.	AWWA C504	Rubber-Seated Butterfly Valves.
23.	AWWA C507	Ball Valves, 6 In. Through 60-in..
24.	AWWA C508	Swing-Check Valves for Waterworks Service, 2 In. Through 24-in..
25.	AWWA C509	Resilient-Seated Gate
26.	AWWA C541	Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.
27.	AWWA C542	Electric Motor Actuators for Valves and Slide Gates.
28.	AWWA C550	Protective Interior Coatings for Valves and Hydrants.
29.	ASTM D1418	Standard Practice for Rubber and Rubber Latices—Nomenclature.
30.	FS TT-C-494B	Coating Compound-Bituminous Solvent Type, Acid Resistant.

31. AISI 1144 Carbon Steel.

1.05 DESCRIPTION

A. The scope of this Section includes requirements for all process valves, twenty-four-inch diameter and smaller, in accordance with applicable standards and regulations. In addition:

1. All other valves referenced in Schedule 40 05 53-1, located after the "End of Section" designation, shall be for liquid service, unless otherwise explicitly indicated for air or digester gas service. Valves for digester gas and air service have been specifically identified in Schedule 40 05 53-1.

2. Electric actuators for electrically actuated valves shall be provided by the valve manufacturers. Electric actuator motors shall conform to the requirements of Section 26 05 91 - Low Voltage Electric Motors.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer’s facility.

2. Quality Assurance Inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that QA inspection may be made.

4. QA inspections shall include (but no be limited to) the following activities:

a. Obtain representative material samples of main components.

b. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer's Certificates of Conformance.

c. Perform visual and dimensional inspection of completed work.

d. Witness surface preparation and coating and lining operations, paint peel tests, and holiday tests.

e. Witness any required hydrostatic, shop leakage and performance tests.

B. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of 5 years of experience in the production of substantially similar valve equipment, and shall show evidence of satisfactory service in at least 5 installations.

C. Supply and Compatibility:

1. Each type of valve, inclusive of all sizes specified for that type of valve, shall be the product of one (1) manufacturer.

D. Welding Work:

1. All welding work, qualification, and inspections shall conform to the requirements of Section 05 05 23.01 - Welding, and is subject to Quality Assurance inspection.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Quality Assurance Requirements:

1) All information necessary and required to substantiate approval of a valve manufacturer in accordance with the quality assurance requirements of this Section.

b. Shop Drawings:

1) Associated valve tag number(s) as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

2) Complete catalog information, descriptive literature, specifications, and identification of all materials of construction.

3) Product data sheets for make and model. The valve(s) with size(s) and option(s) being submitted for approval are specifically identified in the product data sheet(s).

4) Power and control wiring diagrams, including terminals and numbers.

5) Complete nameplate data of electric actuators.

6) Spare parts list.

7) Special tools list.

c. Calculations:

1) Sizing of electric actuators.

2) Sizing of operating mechanisms with extension stems.

3) Sizing of gear actuators.

4) Sizing of anchor bolts.

d. Operation and Maintenance Data: Submit complete manuals including:

1) Copies of all approved Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.

e. Samples:

1) 1 ft. of chain for chain wheel operated valves.

2. Information Submittals:

a. Material test reports representing all major components of valves and operators shall be submitted. All such components shall be traceable to the original heat and/or lot numbers unless otherwise approved.

b. Certificates of compliance with AWWA Standards, if applicable.

c. Certificate of chemical composition and compliance with ASTM standard for anchor and miscellaneous mounting bolts.

d. Certificate of suitability of all valve materials for the specified service.

e. Certified copies of shop test results and inspection data.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Valves and associated appurtenances shall be handled carefully. Valves which are dropped, dented, cracked, and/or otherwise damaged shall not be accepted.

2. Provide full-face protectors of waterproof material fastened to each side of the valve body to protect joints and the valve interior.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the equipment provided under this Section, and as per the requirements of the Contract Documents. In addition:

1. Provide spare part sets for the following types of valves:

a. Gate Valves: Each spare part set shall consist of the following:

1) One (1) set of gaskets.

2) One (1) set of glands.

3) One (1) set of bushings.

b. Butterfly Valves: Each spare part set shall consist of the following:

1) One (1) set of bearings.

2) One (1) set of bearing seals or O-rings.

3) One (1) set of packing.

4) One (1) disc seat (if replaceable).

c. Plug Valves: Each spare part set shall consist of the following:

1) One (1) set of gaskets.

2) One (1) set of packing.

3) One (1) set of upper and lower journal bearings.

d. Check Valves: Each spare part set shall consist of the following:

1) One (1) set of seat rings.

2) One (1) set of hinge bushings.

3) One (1) set of pins.

e. Ball Valves: Each spare part set shall consist of the following:

1) One (1) set of bearings.

2) One (1) set of bearing seals or O-rings.

3) One (1) set of packing.

2. The quantities of spare parts sets to be furnished as part of the Work are given in Table 40 05 53-1, below. Furnish the quantity of spare parts sets given in the table for each type and each size of valve included in this Section.

TABLE 40 05 53-1
QUANTITIES OF SPARE PARTS SETS TO FURNISH

Number of Valves Installed	Sets of Spare Parts Required
1 - 5	1
6 - 10	2
11 - 15	3
16 - 30	5
Greater than 30	5 + (1 for every 10 additional valves)

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment, products. In addition:

1. The following tools shall be furnished:

a. T-Handle Operating Wrenches: As specified herein.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gate Valves (Metal-Seated):
   1. J & S Valves, Huffman, TX.
   2. Or approved equal.

B. Position Indicators:
   1. Trumbull Industries, Inc., Youngstown, OH.
   2. Or approved equal.

C. Stainless Steel Bracket for Position Indicators:
   1. Trumbull Industries, Inc., Youngstown, OH.
   2. Or approved equal.

D. Gate Valves (Resilient-Seated):
   1. Mueller Water Products 1200 Abernathy Road Atlanta Georgia
   2. Dezurik 250 Riverside Avenue North Sartell, MN 56377;
   3. Or approved equal.

E. Thermoplastic Gate Valves:
   1. Asahi/America, Inc., Lawrence, MA;
   2. Or approved equal.

F. Plug Valves (Liquid Service):
   1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
   2. Or approved equal.

G. Plug Valves (Digester Gas Service):
   1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
   2. Or approved equal.

H. Ball Valves (Rubber Seated):
   1. Henry Pratt Co., Aurora, IL;

2. Or approved equal.

I. Thermoplastic Ball Valves:

1. Asahi/America, Inc., Lawrence, MA;
2. Chemtrol Thermoplastics, as manufactured by NIBCO Inc., Elkhart, IN;
3. Hayward Industries, Inc., Elizabeth, NJ;
4. Or approved equal.

J. Butterfly Valves (Clean Water Service):

1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
2. Henry Pratt Co., Aurora, IL;
3. Or approved equal.

K. Butterfly Valves (Air Service – Open/Close Applications):

1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
2. Henry Pratt Co., Aurora, IL;
3. Or approved equal.

L. Butterfly Valves (High Performance for Air Service – Modulating Applications):

1. DeZurik Type HP, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
2. Or approved equal.

M. Butterfly Valves (Digester Gas Service – Open/Close Applications):

1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
2. Henry Pratt Co., Aurora, IL;
3. Or approved equal.

N. Butterfly Valves (High Performance for Digester Gas Service – Modulating Applications):

1. Atwood & Morrill®, as manufactured by Trillium Valves USA™, Inc., Ipswich, MA;
2. DeZurik Type HP, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
3. Or approved equal.

O. Thermoplastic Butterfly Valves:

1. Asahi/America, Inc., Lawrence, MA;
2. Hayward Industries, Inc., Elizabeth, NJ;
3. Or approved equal.

P. Globe Valves for Float Control:
   1. Cla-Val™, Costa Mesa, CA.
   2. Or approved equal.

Q. Check Valves for Liquid Service:
   1. VAG USA LLC., Cranberry Township, PA;
   2. Or approved equal.

R. Thermoplastic Check Valves:
   1. Hayward Industries, Inc., Elizabeth, NJ;
   2. Or approved equal.

S. Thermoplastic Butterfly Check Valves:
   1. Techno Corporation, Maharashtra, India;
   2. Thermoplastic Valves Inc., Emmaus, PA;
   3. Or approved equal.

T. Check Valves for Air and Digester Gas Service:
   1. Crane Co., Stamford, CT;
   2. Or approved equal.

U. Automatic Pressure Reducing, Pressure Sustaining and Electric Check Valves:
   1. VAG USA LLC., Cranberry Township, PA;
   2. Or approved equal.

V. Telescopic Valves:
   1. Envirex, Inc., Waukesha, WI;
   2. Whipps, Inc., Athol, MA;
   3. Or approved equal.

W. Mud Valves:
   1. Troy Valve, as manufactured by Penn-Troy, Inc., Troy, PA;
   2. Or approved equal.

X. Motor-Operators (Open/Close and Modulating):
   1. AUMA Actuators, Canonsburg, PA;
   2. EIM Controls, Houston, Texas.;
   3. Limitorque, Irving, TX;
   4. Rotork, Bath, United Kingdom;
   5. Or approved equal.

Y. Pneumatic Actuators (Open/Close):

1. AUMA Actuators, Canonsburg, PA;
2. EIM Controls, Houston, Texas.;
3. Limitorque, Irving, TX;
4. Rotork, Bath, United Kingdom;
5. Or approved equal.

Z. Position Indicators:

1. Trumbull Industries, Inc., Youngstown, OH.
2. Or approved equal.

AA. Stainless Steel Bracket for Position Indicators:

1. Trumbull Industries, Inc., Youngstown, OH.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Materials of Construction:

a. Compatibility for Service:

1) All materials of construction of the valves shall be confirmed suitable for the application by the valve manufacturer.

2) All valves for digester gas service shall be suitable for gas having the following composition by percent volume and other characteristics:

a) Methane: 60% to 70%.

b) Carbon Dioxide: 30% to 35%.

c) Nitrogen: 0 to 5%.

d) Hydrogen Sulfide: 0 to 0.2%.

e) Gas Temperature: 0°F to 110°F.

f) Relative Humidity: 100%.

b. Wetted parts of the valve shall be protected from galvanic corrosion.

c. Ferrous Metals:

1) Cast iron of the valves, unless otherwise specified, shall conform to ASTM A 126, Class B.

d. Non-Ferrous Metals:

1) Non-ferrous metals shall be provided with standard composition and physical properties conforming to ASTM standards except as otherwise indicated.

2) All non-ferrous metals shall be made from new metals of purest commercial quality. Scrap can be used only when it is the result of the processes of manufacture of articles of similar composition.

3) Bronze items shall have one of the following compositions as specified herein:

a) Composition "A" conforming to ASTM B 61 (Alloy UNS No. C92200) or B 62 (Alloy UNS No. C83600).

b) Composition "B" conforming to ASTM B 61 (Alloy UNS No. C92200) or an approved standard composition having good wear and corrosion resisting qualities and sufficiently ductile for peening into dove-tail grooves.

c) Composition "C" conforming to ASTM B 584, Copper Alloy UNS No. C86500 or C86400; or ASTM B 21, Copper Alloy UNS No. C46400; or ASTM B 124, Copper Alloy UNS No. 37700.

d) Composition "D" conforming to ASTM B 584, Copper Alloy UNS No. C86200 or C86700; or B 21, Copper Alloy UNS No. C46400.

e. Metal Castings:

1) Castings shall be true to pattern, sound, smooth, and without injurious cold shuts, swells, lump scabs, scoria, sand holes, and/or other defects and imperfections.

2) Weld repair will not be allowed without the written permission of the Engineer.

a) Map all defects over ¼-in. wide or ¼-in. deep.

(1) If such defects add up to ten percent or more of the total open surface area, then the casting will be rejected unless waived by the Engineer.

b) Map defects smaller than ¼-in. if they are densely concentrated, and report to the Engineer for approval or repair.

c) Conduct repairs permitted by the Engineer per approved procedures.

(1) Any acceptable casting defect that affects the paint integrity shall be plugged or filled using approved methods and only with the consent of the Engineer.

3) All castings shall be thoroughly, inside and outside, free from sand and dust.

a) Use wire brushes, scrapers or other approved mechanical appliances for this purpose.

b) Do not use acid or other corrosive liquids in cleaning castings.

4) Deviation in casting thickness (for each valve):

a) For valve body castings having a standard thickness < 0.8-in.:

(1) Maximum deviation from the standard thickness: < 0.08-in.

b) For valve body castings having a standard thickness ≥ 0.8-in.:

(1) Maximum deviation from the standard thickness: ≤ 10% of standard thickness.

c) Maximum area of casting over which deficiencies in thickness extend: ≤ 50% of surface area.

5) Identification and Pressure Rating:

a) All valves shall have manufacturer's name and rated pressure cast in raised letters on the valve body.

6) Direction to Open:

a) All valves shall have permanent markings for direction to open.

2. End Connections:

a. Unless otherwise explicitly shown or specified, valves shall be furnished with the following end connections:

1) For exposed valves:

a) Shall have flanged ends.

b) Flanges shall conform to:

(1) For Class 150 valves: ANSI B16.1, Class 125.

(2) For Class 250 valves: ANSI B16.1, Class 250 and Class 300.

c) Pressure class of valve flanges shall be based on pressure class of connected piping as specified in Section 40 06 01 - Schedule for Exposed Piping.

2) For buried valves:

a) Shall be provided with one of the following:

(1) Mechanical or push-on joints, based on connected piping specified in Section 33 06 01 - Schedule for Buried Piping.

(2) Joints shall be restrained or unrestrained, based on connected piping specified in Section 33 06 01 - Schedule for Buried Piping.

3. Operation:

a. Manual operators shall include hand wheel, chain, crank, lever and a T-handle operating wrench.

b. Direction: clockwise to close (unless otherwise specified in Schedule 40 05 53-1 - located after the "End of Section" designation).

c. Force required to open or close manual valves: ≤ 40-lbf.

1) Applies to all manual valves, with or without extension stems.

2) Shall apply to open or close against the specified criteria for the adjoining pipeline specified in:

a) Section 40 06 01 - Schedule for Exposed Piping.

b) Section 33 06 01 - Schedule for Buried Piping.

d. Design pull force on manual operator: ≥ 200-lbf.

e. Design input torque on actuator nut: ≥ 300 ft-lbs.

4. All valves shall be constructed such that operation at the lower range of operating pressures specified shall not result in any leakage.

B. Gate Valves (Metal-Seated):

1. General:

a. Metal seated gate valves shall conform to the requirements of AWWA C500.

b. Types:

1) Unless double disc type (or another type) is specified in Schedule 40 05 53-1, located after the "End of Section" designation, valves shall be solid wedge gate type.

c. Design Working Pressures:

1) For valves ≤ 12-in.: 200 psig.

2) For valves > 12-in.: 150 psig.

d. Maximum Fluid Temperature: 150°F, unless a higher temperature is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

e. Where shown on the Contract Drawings, bypasses shall be provided for valves 16 in. and larger. Bypasses shall be of bolted construction and the bypass valves shall be similar to the main valves. Minimum size of the bypass valves shall be as specified in AWWA C500.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C500.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body, Bonnet, Stuffing Box, and Discs: Gray iron or ductile iron.

2) Seat and Disc Rings: Bronze, Composition "A".

3) Stem and Stem Nut:

a) For valves ≤ 24-in.: Bronze, Composition "C".

b) For valves > 24-in.: Bronze, Composition "D".

4) Disc Pin and Side Spreader: Bronze.

5) Top and Bottom Wedge Nuts: Cast iron with integrally cast bronze bushing.

6) Guide Contacts for valves ≥ 16-in.: Bronze.

7) Rollers and Tracks: Bronze.

8) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

9) All Rubber Items: Acrylonitrile butadiene synthetic rubber.

3. Construction:

a. Provide NRS for:

1) Exposed valves: ≤ 48-in.

b. Provide OS&Y for:

1) Buried valves 4-in. through 12-in.

c. Tongue-and-groove guides:

1) Provided for all solid-wedge gate valves.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators conforming to the requirements of AWWA C500.

a) The gear actuators shall be sized for maximum differential pressures as specified herein.

b. Position indicators:

1) Provide all NRS valves for exposed service with position indicators.

C. Gate Valves (Resilient-Seated):

1. General:

a. Resilient seated gate valves shall conform to AWWA C509.

b. Design Working Pressures:

1) For valves ≤ 12-in.: 200 psig.

2) For valves > 12-in.: 150 psig.

c. Maximum Fluid Temperature: 150°F, unless a higher temperature is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C509.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body, Bonnet, and Stuffing Box: Cast iron

a) Shall conform to the requirements of ASTM A126, Class B.

2) Wedge:

a) Cast iron, symmetrically and fully encapsulated with molded rubber.

(1) Rubber thickness: ≥ ⅛-in.

3) Stem: Manganese Bronze.

a) Alloy: UNS C86500

b) Shall conform to the requirements of ASTM B 584.

4) All Rubber Items: Acrylonitrile butadiene synthetic rubber.

5) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The valves shall be provided with fully encapsulated resilient wedges.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators conforming to the requirements of AWWA C500.

a) The gear actuators shall be sized for maximum differential pressures as specified herein.

D. Thermoplastic Gate Valves:

1. General:

a. Provide thermoplastic gate valves for exposed service only.

b. Design working pressure: The pressure rating of the valve shall be at least equal to the pressure rating of the pipe to which the thermoplastic gate valve is attached.

1) Refer to Section 40 06 01 - Schedule for Exposed Piping, for the pressure rating of the connecting pipeline.

c. Maximum Fluid Temperature: 100°F.

2. Materials:

a. Body: PVC

b. Disc: Polypropylene.

c. Shaft: Steel, encased completely in PVC.

d. Gaskets: The highest chemical compatibility rating with the service specified.

e. Bolts: Fiberglass reinforced plastic.

3. Construction:

a. End Connections: Flanged

b. Valves shall be designed with NRS extended, as shown.

E. Plug Valves (Liquid Service):

1. General:

a. All plug valves shall be of rectangular port, eccentric type unless otherwise specified.

1) Minimum Port Area: 100% of nominal pipe area.

a) Plug valves shall permit pigging with pigs equal to the interior diameter of the connected piping.

b. Design Working Pressures:

1) For valves ≤ 12-in.: 175 psig.

2) For valves > 12-in.: 150 psig.

c. Maximum Fluid Temperature: 180°F.

2. Materials:

a. The materials of construction for the various components of each valve shall be as follows:

1) Body: Ductile-iron, Grade 65-45-12.

a) Shall conform to the requirements of ASTM A 536.

2) Plug Core: Ductile-iron, Grade 65-45-12.

a) Shall conform to the requirements of ASTM A 536,

3) Plug Facing: Neoprene.

a) Hardness: ≥ 70 (Shore A) durometer.

4) Seats:

a) Overlay:

(1) Nickel content: ≥ 90%.

5) Stem Bearings: Type 316 stainless steel, that has been sintered and oil-impregnated.

6) Seal: Neoprene.

7) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Plug:

1) Shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft.

a) The interface between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the line under pressure.

2) Shall be supported to top bearing by the use of spring that is externally adjustable.

3) For valves ≤ 6-in.:

a) Plugs shall be fully encapsulated with rubber.

4) For valves > 6 in.

a) Plugs with rubber facing shall be furnished, unless fully encapsulated plugs are specified herein.

5) Thickness of rubber lining: ≥ ⅛-in.

6) The rubber to metal bond shall withstand minimum 75 lbf. pull conforming to ASTM D 429, Method B.

b. Seats:

1) Shall have a welded overlay ≥ ⅛-in. thick.

2) Overlay shall cover all surfaces contacting the plug face.

c. Valves shall provide drip-tight bi-directional shutoff at the design working pressure, operating pressures, and test pressures.

d. Stem seal shall be multiple V-Ring type.

e. Stem bearings shall be permanently lubricated.

f. Packing and packing gland:

1) Shall be accessible without disassembly of the valve; and

2) Shall be externally adjustable; and

3) Shall be accessible for adjustment without requiring the removal of actuator from the valve.

4. Appurtenances:

a. Valves shall be tagged or marked by the manufacturer to indicate the proper mounting position as specified herein.

b. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators as specified herein, except:

a) 4-in. valves located < 6 ft. above the operating floor.

2) The gear actuators shall be sized for the following differential pressures:

a) For valves ≤ 8-in.: 175 psig.

b) For valves > 8-in.: 100 psig, unless a greater pressure differential is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

F. Plug Valves (Digester Gas Service):

1. General:

a. All plug valves shall be of rectangular port, eccentric type unless otherwise specified.

1) Minimum Port Area:

a) For valves ≤ 20 in.: 80% of nominal pipe area.

b) For valves > 20 in.: 70% of nominal pipe area.

b. Design Working Pressures:

1) For valves ≤ 12-in.: 175 psig.

2) For valves > 12-in.: 150 psig.

c. Maximum Gas Temperature: 180°F, unless a higher temperatures is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

2. Materials:

a. All valve components shall be suitable for the digester gas composition as specified herein.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Ductile-iron, Grade 65-45-12.

a) Shall conform to the requirements of ASTM A 536.

2) Plug Core: Type 316 stainless steel, Grade CF-8M.

a) Shall conform to the requirements of ASTM A743.

3) Plug Facing: Acrylonitrile butadiene synthetic rubber, or other synthetic rubber suitable for the application.

a) Hardness: ≥ 70 (Shore A) durometer.

4) Seats:

a) Overlay:

(1) Nickel content: ≥ 90%.

5) Stem Bearings: Type 316 stainless steel, that has been sintered and oil-impregnated.

6) Seal: Polytetrafluoroethylene.

7) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Plug:

1) Shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft.

a) The interface between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the line under pressure.

2) Shall be supported to top bearing by the use of spring that is externally adjustable.

3) For valves ≤ 6-in.:

a) Plugs shall be fully encapsulated with rubber.

4) For valves > 6 in.

a) Plugs with rubber facing shall be furnished, unless fully encapsulated plugs are specified herein.

5) Thickness of rubber lining: ≥ ⅛-in.

6) The rubber to metal bond shall withstand minimum 75 lbf. pull conforming to ASTM D 429, Method B.

b. Seats:

1) Shall have a welded overlay ≥ ⅛-in. thick.

2) Shall provide a contact area of at least ½-in. width all around.

c. Valves shall provide drip-tight bi-directional shutoff at the design working pressure, operating pressures, and test pressures.

d. Stem seal shall be multiple V-Ring type.

e. Stem bearings shall be permanently lubricated.

f. Packing and packing gland:

1) Shall be accessible without disassembly of the valve; and

2) Shall be externally adjustable; and

3) Shall be accessible for adjustment without requiring the removal of actuator from the valve.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators as specified herein, except:

a) 4-in. valves located < 6 ft. above the operating floor.

2) The gear actuators shall be sized for the following differential pressures:

a) For valves ≤ 8-in.: 175 psig.

b) For valves > 8-in.: 100 psig, unless a greater pressure differential is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

G. Ball Valves (Rubber Seated):

1. General:

a. Rubber seated ball valves shall conform to the requirements of AWWA C507.

b. Design Working Pressure: 150 psig, unless a higher pressure is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

c. Maximum Gas Temperature: 180°F, unless a higher temperatures is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

d. Sizes: 6-in., up to and including 48-in.

2. Materials:

a. The materials of construction for the various components of each valve shall be as follows:

1) Body: Gray iron, ductile iron, or cast steel.

2) Ball: Gray iron, ductile iron, or cast steel.

3) Rubber Seats in Body, Bearing Seal O-Rings, and Packing: Acrylonitrile butadiene synthetic rubber, or another synthetic rubber suitable for the application.

4) Seating Surface on Ball: Type 316 stainless steel or nickel-chrome.

5) Shaft: Type 316 stainless steel.

6) Tapered Pins for Attachment of Shaft to Ball: Type 316 stainless steel.

7) Bearings: Polytetrafluoroethylene -lined with fiberglass backing, self-lubricating.

8) Thrust Collar and Stud Bolt of Thrust Bearing Assembly: Type 316 stainless steel.

9) Shaft Seals: Self-adjusting V-type chevron packing, material same as of rubber seats.

10) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The body shall have full, unobstructed, circular inlet and outlet port diameters equal to the nominal size of the valve and the connected piping.

b. The valve bodies shall have support legs or pads to support the valve and actuator weight when installed in a horizontal pipeline.

c. The ball assembly shall be supported by a two-way thrust bearing assembly consisting of a stud and thrust collar in a grease packed cavity suitable for lifetime lubrication.

d. The valves shall provide drip-tight bi-directional shut-off at the design working pressure as well as operating pressure.

e. Valve seats shall seal a full 360° circumference without interruption.

f. Valve seats shall be field adjustable around the 360° circumference and replaceable without dismantling the operator, shaft or ball.

g. Packing shall be:

1) Self-adjusting, chevron type; and

2) Shall be accessible without having to dismantle the valve.

4. Appurtenances:

a. Gear Actuator for Manual Valves:

1) Gear actuators shall conform to the requirements AWWA C507.

2) The gear actuators shall be sized for the following differential pressures:

a) For valves ≤ 10-in.: Shall be sized for the differential pressure equal to the design working pressure of the valve and port velocity of 35 ft/s.

b) Fr valves > 10-in.: Shall be sized for maximum differential pressures and flow velocities as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

H. Thermoplastic Ball Valves:

1. General:

a. Provide thermoplastic ball valves for exposed service only.

b. Design working pressure: ≥ 125 psig at 75°F.

c. Maximum Fluid Temperature: 100°F.

2. Materials:

a. Body: Schedule 80 PVC conforming to the requirements of ASTM D1785 Type I, normal impact.

3. Construction:

a. All thermoplastic ball valves shall be of true union design

b. Valves shall be provided with renewable polytetrafluoroethylene ball seats and ASTM D1418 FKM fluoropolymer elastomer synthetic rubber seals.

I. Butterfly Valves (Clean Water Service):

1. General:

a. Butterfly valves for clean water service shall conform to AWWA C504 Class 150B.

b. Design Working Pressure: 150 psig.

c. Maximum Fluid Temperature: 180°F.

d. Sizes:

1) For flanged butterfly valves: ≤ 72-in.

2) For mechanical joint butterfly valves: ≤ 48 in.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C504.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Cast iron, ductile iron, or alloy cast iron.

c. Shaft: Type 316 stainless steel.

1) Discs:

a) For valves < 30-in.: Cast iron.

b) For valves ≥ 30-in.: Ductile iron.

d. Seats: Acrylonitrile butadiene synthetic rubber, or other synthetic rubber suitable for the application.

1) Seating Surfaces: Type 316 stainless steel.

2) Bearings:

a) For valves < 24-in.: Nylon.

b) For valves ≥ 24-in.: Fiberglass with polytetrafluoroethylene lining.

3) Shaft Seals: Same as of seats.

4) Tapered Pins for Attachment of Shaft to Disc: Type 316 stainless steel.

5) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. Seals:

1) Shall be self-adjusting V-type chevron; and

2) Shall be mounted in the body.

d. Valve packing shall be replaceable without dismantling the valve.

e. Valve seats:

1) For valves ≥ 24-in.: rubber seats shall be field replaceable.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Gear actuators shall conform to the requirements of C504.

2) Size gear actuators as follows:

a) For butterfly valves ≤ 20-in.: 150 psi differential pressure and 16 ft/s velocity.

b) For butterfly valves > 20-in.: Shall be sized based on maximum differential pressures and velocities as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

J. Butterfly Valves (Air Service – Open/Close Applications):

1. General:

a. Butterfly valves for air service (open/close applications) shall conform to AWWA C504 Class 25B.

b. Design Working Pressure: 25 psig.

c. Sizes: ≤ 72-in.

d. Maximum air temperature: 250°F.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C504.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Type 316 stainless steel.

2) Shaft: Type 316 stainless steel.

3) Seats: Ethylene-propylene terpolymer (EPT) rubber.

4) Discs: Type 316 stainless steel.

5) Seating Edges on Disc: Type 316 stainless steel.

6) Shaft Bearings: Self-lubricating sleeve type, fiberglass with polytetrafluoroethylene lining or synthetically manufactured mica chemically linked to virgin polytetrafluoroethylene for valves smaller than 24 in.

7) Shaft Seals: Self-adjusting V-type chevron, EPT.

8) Tapered Pins for Attachment of Shaft to Disc: Type 316 stainless steel.

9) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. End connections: Flanged.

d. Seals:

1) Shall be self-adjusting V-type chevron; and

e. Shall be mounted in the body.

f. Valve packing shall be replaceable without dismantling the valve.

g. Valve Seats:

1) Shall be recess mounted and securely fastened to the valve body.

2) For butterfly valves ≤ 20-in.:

a) Seats shall be simultaneously molded in and bonded to the body.

b) Seats shall withstand 75 lbf pull under test procedure ASTM D-429, Method B.

3) For butterfly valves > 20-in.:

a) Seats shall be retained in the valve body by mechanical means.

4) Valves employing complete rubber liners are not acceptable.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Gear actuators shall conform to the requirements of C504.

2) Size gear actuators as follows:

a) Differential pressure: ≥ 35 psig.

K. Butterfly Valves (High Performance for Air Service – Modulating Applications):

1. General:

a. Type: High Performance.

b. Butterfly valves for modulating air service shall provide a control range between 20% to 80% open, as a minimum.

c. Cv Values: Refer to Schedule 40 05 53-2, located after the "End of Section" designation for full open Cv values for high performance butterfly valves for air service (modulating applications).

d. Design Working Pressure: 150 psig.

e. Body Style: Lugged.

f. Maximum air temperature: 300°F.

2. Materials:

a. The materials of construction for the various components of each valve shall be as follows:

1) Body: Type 316 stainless steel, ASTM A351, Grade CF8M.

2) Disc: Type 316 stainless steel, ASTM A351, Grade CF8M.

3) Seat Retainer: Type 316 stainless steel, ASTM A240.

4) Shaft: 17-4 PH stainless steel, ASTM A564, Type 630, H1150M.

5) Seat Ring: Polytetrafluoroethylene.

6) Back-up Ring: Titanium ASTM B265, Grade 3.

7) Locator Bearing Carrier: Type 317 stainless steel, ASTM A743, Grade CG8M.

8) Liner: Type 317 stainless steel with polytretrafluoroethylene woven fabric.

9) Thrust Bearing: Type 317 stainless steel with polytetrafluoroethylene woven fabric.

10) Packing: Polytetrafluoroethylene.

11) Packing Gland: Type 317 stainless steel, ASTM A743, Grade CF8M.

12) Disc Pins: Type 316 or 317 stainless steel, ASTM A276.

13) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. Disc: Airfoil design.

d. Valve packing shall be replaceable without removing the valve from the piping.

L. Butterfly Valves (Digester Gas Service – Open/Close Applications):

1. General:

a. Butterfly valves for air service (open/close applications) shall conform to AWWA C504 Class 25B.

b. Design Working Pressure: 25 psig.

c. Sizes: ≤ 24-in.

d. Body Style: Wafer.

e. Maximum gas temperature: 180°F.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C504.

b. All valve components shall be suitable for the digester gas composition as specified herein.

c. The materials of construction for the various components of each valve shall be as follows:

1) Body: Type 316 stainless steel.

2) Shaft: Type 316 stainless steel.

3) Seats: Acrylonitrile butadiene synthetic rubber or other synthetic rubber suitable for the application.

4) Discs: Type 316 stainless steel.

5) Shaft Bearings: Self-lubricating sleeve type, fiberglass with polytetrafluoroethylene lining or synthetically manufactured mica chemically linked to virgin polytetrafluoroethylene.

6) Shaft Seals: Same as of seats.

7) Tapered Pins for Attachment of Shaft to Disc: Type 316 stainless steel.

8) All internal and external bolting and other hardware including pins, set screws, plug, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. Seals:

1) Shall be self-adjusting V-type chevron; and

2) Shall be mounted in the body.

d. Valve Seats:

1) Shall extend over the body sides so that gaskets are not required.

2) Seats shall be simultaneously molded in and bonded to the body.

3) Seats shall withstand 75 lbf pull under test procedure ASTM D-429, Method B.

e. Valve packing shall be replaceable without removing the valve from the piping.

4. Appurtenances:

a. Gear Actuator for Manual Valves:

1) Gear actuators shall conform to the requirements of C504.

2) Size gear actuators as follows:

a) For gas operating pressure ≤ 15.0 psig: Differential pressure: ≥ 25 psig.

b) For gas operating pressure > 15.0 psig: Differential pressure: As specified in Schedule 40 05 m53-1, located after the "End of Section" Designation.

M. Butterfly Valves (High Performance for Digester Gas Service – Modulating Applications):

1. General:

a. Butterfly valves for digester gas service (modulating applications) shall conform to ANSI B16.34 and API 609.

b. Type: High Performance.

c. Butterfly valves for modulating air service shall provide a control range from 20% to 80% open, as a minimum.

d. Cv Values: Refer to Schedule 40 05 53-2, located after the "End of Section" designation for full open Cv values for high performance butterfly valves for air service (modulating applications).

e. Design Working Pressure: 150 psig.

f. Body Style: Lugged.

g. Maximum air temperature: 300°F.

2. Materials:

a. All valve components shall be suitable for the digester gas composition as specified herein.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Type 316 stainless steel.

2) Disc: Type 316 stainless steel.

3) Shaft: 17-4 PH stainless steel, ASTM A564, Type 630, H1150M,

4) Bearings: Carbon.

5) Seal: Type 316 stainless steel and graphite.

c. Seat Ring: Type 316 stainless steel, faced to mate with ANSI Class 150 flanges, supported and nested in the valve body.

d. Packing: Polytetrafluoroethylene with Type 316 stainless steel gland.

e. All other hardware shall be Type 316 stainless steel.

3. Construction:

a. The butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. Disc:

1) Airfoil design.

2) 360° seating.

d. Disc Seal:

1) Shall consist of laminations of stainless steel bonded together with a graphite intermediate gasketing material.

2) The laminated seal stack shall be secured to the disc by a bolted clamp ring, for ease of replacement and to prevent seal movement which creates wedging and wear on body seat.

e. Seat shall be cast into the body and machined to an elliptical section of a cone to achieve a tight, metal-to-metal seal with the disc seal.

f. Shaft:

1) One-piece construction and centerless ground to minimize bearing and packing wear.

2) Bearings shall be one piece to fully support the shaft radially and axially.

g. Disc shall be pinned to the shaft with removable hardware.

1) Pinning method shall accurately align the disc and shaft with the valve body.

h. The valves shall be triple offset design to prevent any rubbing between the seal and seat throughout the stroke as well as at closure.

N. Thermoplastic Butterfly Valves:

1. General:

a. Provide thermoplastic butterfly valves for exposed service only.

b. Design working pressure: The pressure rating of the valve shall be at least equal to the pressure rating of the pipe to which the thermoplastic gate valve is attached.

1) Refer to Section 40 06 01, Schedule for Exposed Piping, for the pressure rating of the connecting pipeline.

c. Maximum Fluid Temperature: 100°F.

2. Materials:

a. Body: PVC

b. Disc: Polypropylene.

c. Shaft: Stainless steel, encased completely in PVC.

d. Seats, seals, and all other parts which may come in contact with the liquid shall be Ethylene Propylene Diene Termopolymer (EPDM);

e. Bolts:

1) Fiberglass; or

2) Type 316 stainless steel.

3. Construction:

a. End Connections: Flanged

O. Globe Valves for Float Control:

1. General:

a. Globe valves shall be angle or straight, as shown on the Contract Drawings.

b. Float valve shall be single-seated, diaphragm operated, pilot-controlled.

c. Float shall be spring loaded & hydraulically operated.

d. Pressure drop through valve at maximum specified flow: ≤ 8 psi.

e. Design Working Pressures:

1) For valves ≤ 12-in.: 175 psig.

2) For valves > 12-in.: 150 psig.

f. Maximum Fluid Temperature: 180°F.

g. Provide globe valves for float control complete with float and adequate float rod extensions having adjustable collars

2. Materials:

a. Valve body: Cost iron.

b. Valve spring: Type 316 Stainless steel.

c. Seat: Type 316 stainless steel.

d. Seat ring: Bronze.

e. Seals: acrylonitrile butadiene synthetic rubber.

f. Diaphragm: Nylon reinforced acrylonitrile butadiene synthetic rubber.

g. Disc: Acrylonitrile butadiene synthetic rubber.

h. Pilot valve body: bronze.

i. Float: Polypropylene.

3. Construction:

a. All necessary adjustments shall be possible without removing valve from the line.

b. Seat ring shall be readily replaceable with no special tools

c. Diaphragm assembly shall be fully guided, top and bottom.

d. Diaphragm assembly shall be fully supported by the valve casting in both the full-open and full-closed positions to eliminate strain on the diaphragm.

e. Packing glands shall not be permitted.

f. Disc shall have a rectangular cross section

g. Disc shall be reversible to provide two (2) usable sealing surfaces.

h. Float control shall be mounted directly to the fill valve, and shall not be remotely mounted.

i. Float shall be adjustable from 1-in. of travel to 19-in. of travel on its actuating rod.

4. Appurtenances:

a. Provide valve position indicator to indicate flow at any given time.

b. Provide a flow-clean type strainer shall be provided to remove any solids that may be of sufficient size to damage or plug the pilot and other control components.

1) Wye-type strainers shall not be acceptable.

c. Flow-clean strainer shall screw directly into the inlet valve port without a bushing or port extension.

d. Flow-clean strainers shall be of two-part design.

1) Inner mesh shall be of nickel-copper alloy equal to Monel ASTM B164 and shall be designed to support the outer screen.

2) The outer screen shall be of 0.008-in. nickel-copper alloy equal to Monel ASTM B164 wire, having a 40 × 40 mesh.

P. Check Valves (Liquid Service):

1. General:

a. Check valves shall conform to the requirements of AWWA C508.

b. Design Working Pressure:

1) For check valves < 12-in.: 175 psig.

2) For check valves ≥ 12-in.: 150 psig.

c. Sizes: ≤ 24-in.

d. Type: Swing style, resilient-seated.

e. Check valves shall be suitable for horizontal or vertical mounting.

2. Materials of Construction:
   a. All materials of construction shall conform to the requirements of AWWA C508.
   b. The materials of construction for the various components of each valve shall be as follows:
      1) Body, Disc, Cover and Gland: Cast-iron.
      2) Disc Arm: Ductile iron.
      3) Hinge Shaft: Type 316 stainless steel.
      4) Hinge Shaft Bushings: Bronze, ASTM B 62, Alloy UNS C83600.
      5) Shaft End Plate: Type 316 stainless steel.
      6) Body Seat and follower ring on rubber seat on disc: Type 316 stainless steel.
      7) Disc Center Pin Assembly: Type 316 stainless steel.
      8) Air Cushion Chamber:
         a) Chamber and Plunger: Bronze, ASTM B 62, Alloy UNS C83600.
         b) Linkages and Pins: Type 316 stainless steel.
         c) Air Check Valve and Tubing: Brass.
      9) All Rubber Items:
         a) For service ≤ 180°F: Acrylonitrile butadiene synthetic rubber.
         b) For service > 180°F: ASTM D1418 FKM fluoropolymer elastomer synthetic rubber.
      10) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.
      11) Gland Packing: Graphite and Kevlar.
3. Construction:
   a. Check valves shall have a clear waterway with full open area equal to the pipe size.
   b. Check valves shall be provided with outside adjustable weight and lever.
   c. For check valves > 6 in.:
      1) Provide adjustable air cushion chambers.

d. Check valve seats shall be:

1) Field replaceable; and

2) Valve seats shall be mechanically attached.

Q. Check Valves (Air Service):

1. General:

a. Design Working Pressure: 125 psig.

b. Operating Pressure: As specified in Schedule 40 05 53-1, located after the "End of Section" designation.

c. Internal Temperature Rating: 250°F.

d. Maximum head loss at design operating condition: As specified in Schedule 40 05 53-1, located after the "End of Section" designation.

e. Type: double door; spring loaded.

2. Materials of Construction:

a. Body: Type 316 stainless steel.

b. Double Doors: Aluminum alloy.

c. Hinge and Stop Shafts: Type 316 stainless steel.

d. Springs: Type 316 stainless steel.

e. Seal Material: ASTM D1418 FKM fluoropolymer elastomer synthetic rubber.

f. All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Check valves shall be tight seating against operating back pressure with zero leakage.

b. Check valves shall operate without hammer or shock.

R. Check Valves (Digester Gas Service):

1. General:

a. Check valves shall conform to the requirements of API 594, API 598, and ASME/ANSI B16.34.

b. Design Working Pressure: 150 psig.

c. Cv Values: Refer to Schedule 40 05 53-2, located after the "End of Section" designation for full open Cv values for check valves for digester gas service.

d. Style: Wafer.

e. Maximum air temperature: 300°F.

f. Cracking Pressure: As specified in Schedule 40 05 53-1, located after the "End of Section" Designation.

2. Materials:

a. All valve components shall be suitable for the digester gas composition as specified herein.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Type 316 stainless steel.

2) Discs: Type 316 stainless steel.

3) Hinge and Stop Shafts: Type 316 stainless steel.

4) Springs: Inconel.

5) Seat Material: Kalrez, or other synthetic rubber suitable for digester gas service.

6) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Check valves shall operate without hammer or shock.

b. Check valves shall be equipped with double doors, and low torque springs.

1) Each of the dual plates shall be provided with its own springs to provide independent closing action

c. Seat shall be completely out of the flow stream and protected from wear.

d. Each valve shall incorporate a hinge pin and a stop pin of sufficient strength to contain the valve plates within the valve body and to serve as a stop for plates in open position.

S. Thermoplastic Check Valves:

1. General:

a. Provide thermoplastic check valves for exposed service only.

b. Design working pressure: The pressure rating of the valve shall be at least equal to the pressure rating of the pipe to which the thermoplastic gate valve is attached.

1) Refer to Section 40 06 01, Schedule for Exposed Piping, for the pressure rating of the connecting pipeline.

c. Maximum Fluid Temperature: 100°F.

2. Materials:

a. Body: Schedule 80 PVC conforming to the requirements of ASTM D1785 Type I, normal impact.

b. Ball: PVC.

c. Seals: Ethylene Propylene Diene Termopolymer (EPDM).

3. Construction:

a. All thermoplastic check valves shall be of true union design

b. Seals shall be O-rings.

c. End Connections: Flanged.

d. Valves shall be of such design that when the valve is open the free flow area equals the pipeline area.

T. Thermoplastic Butterfly Check Valves:

a. Provide thermoplastic butterfly check valves for exposed service only.

b. Design working pressure: 30 psig.

c. Maximum Fluid Temperature: 195°F.

2. Materials of Construction:

a. Valve body: Solid CPVC

b. Valve plates: CPVC.

3. Construction:

a. Thermoplastic butterfly check valves shall be short body, full port flow through, and of hinge clamp and post design.

b. End Connections: Flanged.

U. Automatic Pressure Reducing Valves:

1. General:

a. Automatic pressure reducing valves shall reduce a higher fluctuating upstream pressure to a lower steady downstream pressure within a specified range of flow variations.

b. Rated Working Pressure:

1) Automatic Pressure Reducing Valves ≤ 12-in.: 250 or 500 psig.

2) Automatic Pressure Reducing Valves > 12-in.: 250 psig.

c. Sizing Data:

1) Refer to Schedule 40 05 53-3, located after the "End of Section" designation.

2) The downstream set point pressure shall be field adjustable over the range from 110% down to approximately 0%.

2. Materials:

a. Body:

1) Cast iron, ASTM A126, Class B; or

2) Ductile Iron, ASTM A536.

b. Piston: Bronze, ASTM B62.

c. Liner: Bronze, ASTM B62.

d. Seat crown: Bronze, ASTM B62.

e. Indicator rod and hardware: Bronze, ASTM B62.

f. Vent tube: Bronze, ASTM B62.

g. Glands: Bronze, ASTM B62.

h. All Flexible Items: Acrylonitrile butadiene synthetic rubber, or other synthetic rubber suitable for the application.

i. Packing: Polytetrafluoroethylene.

j. All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Type:

1) Shall be either of the following, as shown on the Contract Drawings:

a) Pilot operated globe; or

b) Angle style valves.

b. The flow area shall be equal to nominal pipe area when valve is fully open.

c. The valves shall include a one-piece piston and a full stroke length liner.

1) The seating shall include a replaceable resilient seat ring mounted on underside of the piston and a metal seat integral with the liner or attached to the valve body.

d. Provide V-ports for pressure control at low flows.

e. The valves shall provide a drip-tight shut-off at the rated pressure when closed.

f. Provide a removable flanged cover to access the valve internals.

g. Provide an indicator rod attached to the piston for visual position indication of the piston.

h. Control Piping:

1) The pilot control piping shall include the following minimum items:

a) A needle valve for field adjustment of closing speed.

b) A pilot valve to adjust the required set point downstream pressure.

c) A Y-strainer with a valved blow-off connection.

d) Isolation valves.

2) All control piping components (including piping, tubing, fittings, valves and Y-strainer) shall be brass or bronze with stainless steel wetted trim.

V. Automatic Pressure Sustaining Valves:

1. General:

a. Automatic pressure sustaining valves shall maintain a minimum set point upstream pressure regardless of variations in flow demand and/or variations in downstream pressure.

1) The valve will open on an increase in upstream pressure and close on a decrease in upstream pressure to maintain the required set point upstream pressure.

b. Rated Working Pressure:

1) Automatic Pressure Reducing Valves ≤ 12-in.: 250 or 500 psig.

2) Automatic Pressure Reducing Valves > 12-in.: 250 psig.

c. Sizing Data:

1) Refer to Schedule 40 05 53-4, located after the "End of Section" designation.

2) The downstream set point pressure shall be field adjustable over the range from 110% down to approximately 0%.

2. Materials:

a. Body:

1) Cast iron, ASTM A126, Class B; or

2) Ductile Iron, ASTM A536.

b. Piston: Bronze, ASTM B62.

c. Liner: Bronze, ASTM B62.

d. Seat crown: Bronze, ASTM B62.

e. Indicator rod and hardware: Bronze, ASTM B62.

f. Vent tube: Bronze, ASTM B62.

g. Glands: Bronze, ASTM B62.

h. All Flexible Items: Acrylonitrile butadiene synthetic rubber or other synthetic rubber suitable for the application.

i. Packing: Polytetrafluoroethylene.

j. All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Type:

1) Shall be either of the following, as shown on the Contract Drawings:

a) Pilot operated globe; or

b) Angle style valves.

b. The flow area shall be equal to nominal pipe area when valve is fully open.

c. The valves shall include a one-piece piston and a full stroke length liner.

1) The seating shall include a replaceable resilient seat ring mounted on underside of the piston and a metal seat integral with the liner or attached to the valve body.

d. Provide V-ports for pressure control at low flows.

e. The valves shall provide a drip-tight shut-off at the rated pressure when closed.

f. Provide a removable flanged cover to access the valve internals.

g. Provide an indicator rod attached to the piston for visual position indication of the piston.

h. Control piping:

1) The pilot control piping shall include the following minimum items:

a) A needle valve for field adjustment of closing speed.

b) A pilot valve to adjust the required set point upstream pressure.

c) A Y-strainer with a valved blow-off connection.

d) Isolation valves.

2) All control piping components (including piping, tubing, fittings, valves and Y-strainer) shall be brass or bronze with stainless steel wetted trim.

W. Automatic Electric Check Valves

1. General:

a. Automatic electric check valves shall open and close at a controlled rate during a pump start-up and shut-down.

1) During emergency pump shut-down, due to power failure or other malfunctions, valve shall close quickly to minimize reverse flow through the pump.

b. Rated Working Pressure:

1) Automatic Electric Check Valves ≤ 12-in.: 250 or 500 psig.

2) Automatic Electric Check Valves > 12-in.: 250 psig.

c. Cv Values: Refer to Schedule 40 05 53-2, located after the "End of Section" designation for full open Cv values for high performance butterfly valves for air service (modulating applications).

d. Opening / Closing Time of Valve: 1min to 5min, adjustable.

e. Emergency Closing Time of Valve: 15sec to 30sec, adjustable.

2. Materials of Construction:

a. Body:

1) Cast iron, ASTM A126, Class B; or

2) Ductile Iron, ASTM A536.

b. Piston: Bronze, ASTM B62.

c. Liner: Bronze, ASTM B62.

d. Seat crown: Bronze, ASTM B62.

e. Indicator rod and hardware: Bronze, ASTM B62.

f. Vent tube: Bronze, ASTM B62.

g. Glands: Bronze, ASTM B62.

h. All Flexible Items: Acrylonitrile butadiene synthetic rubber or other synthetic rubber suitable for the application.

i. Packing: Polytetrafluoroethylene.

j. All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Type:

1) Shall be either of the following, as shown on the Contract Drawings:

a) Pilot operated globe; or

b) Angle style valves.

b. The flow area shall be equal to nominal pipe area when valve is fully open.

c. The valves shall include a one-piece piston and a full stroke length liner.

1) The seating shall include a replaceable resilient seat ring mounted on underside of the piston and a metal seat integral with the liner or attached to the valve body.

d. Provide V-ports for optimum surge control during normal pump start-up and shut-down.

e. The valves shall provide a drip-tight shut-off at the rated pressure when closed.

f. Provide a removable flanged cover to access the valve internals.

g. Provide an indicator rod attached to the piston for visual position indication of the piston.

h. Control piping:

1) The pilot control piping shall include the following minimum items:

a) A solenoid operated pilot valve for normal controlled opening and closing of the check valve.

b) An emergency solenoid pilot valve for quick closing of the check valve.

c) Manual separate needle valves for controlled normal opening and closing and for emergency closing of the check valve.

d) A Y-strainer with a valved blow-off connection.

e) Isolation valves.

2) All control piping components including piping, tubing, fittings, valves and Y-strainer: Brass or bronze with stainless steel wetted trim.

i. Provide SPDT limit switches with NEMA 4 enclosure as shown on the Contract Drawings.

X. Telescopic Valves:

1. General:

a. The length of the telescopic tube shall be sufficient to allow the full required travel with not less than 12-in. tube length remaining below the companion flange when the valve is fully raised.

b. Manual Operator:

1) The manual operators shall be of rack and pinion type.

a) The rack and pinion type operator shall be provided with a lock-in-position mechanism.

b) The rack locking mechanism shall be stainless steel spring loaded plunger type.

2) The manual operator shall be fully enclosed and mounted on a pedestal.

3) The manual operator shall provide a minimum vertical adjustment of ⅜-in..

4) Maximum Effort Required on Handwheel: 40 lb.

2. Materials:

a. Telescopic Tube and Bail: Type 316L stainless steel, ASTM A240.

b. Seal Ring:

1) Polyurethane.

2) Thickness: ≥ ¾-in.

c. Stem: Type 316 stainless steel.

d. All Bolting including bolts, nuts and washers: Type 316 stainless steel, ASTM A193, Grade B.

e. Operators:

1) Enclosure: Cast aluminum.

2) Pinion Shaft: Type 316 stainless steel.

3) Provide stainless steel grease fittings.

f. Pedestal:

1) Schedule 40 Type 316 stainless steel.

g. Rack and Rack Guides:

1) Material: Type 316 stainless steel, ASTM A276.

h. Handwheels:

1) Ductile iron or cast aluminum.

i. Stem covers:

1) Clear butyrate plastic; or

2) Grade 153 Polycarbonate.

3. Construction:

a. The tube shall have a square cut unless otherwise specified herein.

b. Telescopic tube:

1) Shall be polished on the outside.

2) Shall be minimum Schedule 10S.

c. A one-piece seal ring and a mounting flange shall be furnished with each valve.

1) The seal shall be sufficiently compliant to provide a tight seal over the entire range of travel of the telescopic tube.

2) Mounting flange shall have ANSI B16.1, Class 125, bolting holes.

d. Manual Operators:

1) Operators:

a) Pinion shaft shall be supported on bronze sleeve bearings and thrust washers.

b) Shall be grease lubricated.

2) Pedestal:

a) Minimum Height: 36-in.

b) Tube Size: ≥ 6 in..

3) Rack and Rack Guides:

a) Minimum 1½-in. square or round with an adjustable stop collar to limit downward movement.

4) Handwheels:

a) All handwheels shall conform to AWWA C500.

b) Arrow indicating direction of opening and word "OPEN" shall be cast on the rim of the handwheel.

5) Stem Covers:

a) The stems shall be furnished with pipe stem covers.

b) The cover shall be furnished with a cast adaptor for mounting cover to bench and floor stands.

c) Stem cover shall be designed and furnished with gasketing and breathers to eliminate water intrusion into operator and condensation within the cover.

d) The cover shall be provided with Mylar tape with legible markings showing the valve position at one inch intervals and open/close limits of the valve.

Y. Mud Valves

1. General:

a. The mud valves shall be:

1) Rising stem type; or

2) Flanged end type.

2. Materials:

a. Body: Cast iron, ASTM A 126, Class B.

b. Yoke: Cast iron, ASTM A 126, Class B.

c. Gate: Cast iron, ASTM A 126, Class B .

d. Plates: Cast iron, ASTM A 126, Class B.

e. Gate and Body Rings: Bronze, ASTM B62.

f. Stem: Bronze, ASTM B138.

g. All Bolting including Bolts, Nuts and Washers: Type 316 stainless steel, ASTM A193, Grade B.

3. Construction:

a. Body ring shall be threaded and screwed into the frame.

Z. Gear Actuators for Manual Valves:

1. General:

a. Gear actuators shall be designed to hold the valve in any intermediate position without creeping or vibrating.

2. Materials:

a. Housing: Cast Iron, ASTM A126, Class B.

b. Gear Sector: Ductile Iron, ASTM A536.

c. Worm Gear: Steel, AISI 1144, hardened and tempered to an average Rc 40 and within range of Rc 35-45.

d. All Bearings: Bronze oil impregnated.

e. All Hardware including Bolts, Nuts, Washers, Set Screws and Pins: Type 316 stainless steel.

3. Construction:

a. Each actuator shall have all gearing totally enclosed.

b. The operator shaft and the gear sector shall be supported on permanently lubricated bronze bearings.

c. Metal encased spring loaded seals shall be provided in top and bottom covers of the gear housing.

d. Diameter ratio of the handwheel or the chainwheel and the gear sector: < 2.

e. For buried or submerged valves, the gear actuator shall be grease-packed and designed to withstand submersion and be droptight in water to 20 ft. head.

4. Appurtenances:

a. A valve position indicator shall be provided on each actuator. Stop-limiting devices shall be provided for open and closed position.

b. An adjustable stop shall be provided to adjust the seating pressure.

AA. Electric Actuators (Open/Close):

1. General:

a. Electric actuators for open/close service shall conform to the requirements of AWWA C542.

b. Application Criteria:

1) Ambient Temperature Rating: -20°F to +150°F.

2) Ambient Humidity: 100%.

3) Maximum design differential pressures and forward/reverse flows applicable to the valves:

a) Refer top Schedule 40 05 53-1, located after the "End of Section" designation.

b) For the service conditions of buried piping on which the actuated valve is installed, refer to Section 33 06 01 – Schedule for Buried Piping.

c) For the service conditions of exposed piping on which the actuated valve is installed, refer to Section 40 06 01.

4) Opening and Closing Speeds: 6-inches per minute.

5) Power Supply: 480 volts, 3 phase, 60 Hz.

6) Control Voltage: 120 volts, single phase, 60 Hz.

7) Torques: Per valve manufacturer.

8) Duty Cycle: ≥ 6 starts / hr.

9) Each electric actuator shall be equipped with a handwheel for manual operation.

a) The handwheel shall be connected such that operation by the motor will not cause the handwheel to rotate.

b) Should power be returned to the motor while the handwheel is in use, design of the unit shall prevent transmission of the motor torque to the handwheel.

10) The actuator shall be operable with handwheel or chainwheel even after the electric motor has been disengaged and removed for repairs.

c. Remote Control Panels:

1) Provide separate remote control panels for all valves with electric actuators located ≥ 6.00 ft. above the operating floor.

2) The separate remote control panels shall be provided with separate push-button stations.

3) The separate remote control panels shall be installed approximately 5 ft. above the operating floor at an approved location.

4) Electrical wiring shall be modified as required for the remote location of the control panels.

d. Sizing of each electric actuator shall be coordinated with the valve manufacturer who shall furnish the valve and the electric actuator as a unit.

e. The electric actuators shall be suitable for the valve orientation as shown on the Contract Drawings.

f. All electrical components shall conform to the area classification shown on the Contract Drawings.

2. Materials and Construction:

a. Electric Motor:

1) Motor shall be in accordance with the requirements of Section 26 05 91 - Low Voltage Electric Motors.

2) Motor shall be specifically designed for valve actuator service. It shall have high torque characteristics and shall have a maximum continuous total temperature rating of 70°C.

3) The motor shall be sized for at least 1.5 times the actuator torque requirement.

b. Actuator Gearing:

1) Housing: Die-cast aluminum.

2) Close coupled to electric motor.

3) Input Shaft Gearing: Spur or bevel gear assembly.

4) Output Shaft Gearing: Self-locking worm gears with minimum gear backlash to prevent valve disc chatter or vibration. The gearing shall be rated for twice the required actuator torque.

5) All gearing shall be of hardened alloy steel or a combination of hardened alloy steel and alloy bronze, accurately cut by hobbing machine.

6) Lubrication: Oil bath or grease.

7) Bearings: Ball or roller with a minimum B-10 life of 100,000 hrs.

8) Input Shaft: Hardened alloy steel.

9) Provide mechanical stops adjustable from 0° to 90° at each end of travel.

c. Limit Switches:

1) Each actuator shall be provided with "end of travel" limit switches to allow control of desired end position for each direction of travel.

2) Travel stops shall be threaded and of Type 316 stainless steel to allow adjustment at each end of actuator stroke.

3) Open and close limit switches shall be geared to the drive mechanism and in step at all times, whether the unit is operated electrically or manually and whether or not the actuator is powered by the 3-phase power supply. Friction devices or set-screw arrangements shall not be used to maintain the setting.

4) Limit switch gearing shall be appropriately lubricated.

5) The driven mechanism shall be totally enclosed to prevent entrance of foreign matter or loss of lubricant.

6) Each actuator shall be provided with four auxiliary contacts. Two contacts shall close and two contacts shall open at a desired end position for each direction of travel.

7) Switches shall be rated 5A or 10A at 120V, as applicable for the specified equipment.

d. Torque Switches:

1) Adjustable torque switches shall be provided with each valve actuator.

a) The torque switches shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches or other devices.

2) Torque switches shall be wired to de-energize the valve actuator motor in the event excessive torque is developed during either direction of travel.

3) It shall be possible to select the torque switches to control the open and close limit positions in either direction of valve travel.

4) Dry contacts, 5A or 10A, 120V, as applicable for the specified equipment, shall be provided for remote high torque alarm for automatically controlled valves.

3. Appurtenances:

a. Handwheel and Chainwheel:

1) Provide each electric actuator with a handwheel.

2) Maximum Effort on Rim of Handwheel:

a) For seating or unseating Load: ≤ 80 lbf.

b) For Running Load: ≤ 60 lbf..

3) The handwheel shall have an arrow and the word "OPEN" or "CLOSE" indicating required rotation.

4) The handwheel shall operate in the clockwise direction to close.

5) Chain Operators:

a) All valves ≥ 6.00 ft. above the operating floor level shall be equipped with chain operators.

6) Handwheels and chain operators shall conform to the requirements specified separately herein.

b. All fasteners shall be Type 316 stainless steel.

4. Controls:

a. Provide each electric actuator with controls:

1) Provide controls in a separate compartment integral with the actuator.

2) Enclosure: NEMA 4X, unless NEMA 7 is required for duty in the actuator location .

3) Starter:

a) Provide a combination reversing magnetic starter with circuit breaker and disconnect switch.

b) Housing:

(1) For nonhazardous areas: NEMA 4X, Type 316 SS enclosure.

(2) For hazardous areas: Class 1 Division 2 cast aluminum housing.

4) Control Power Transformer:

a) Provide a transformer to transform the rated three phase, 60 Hz power to 120V, single phase.

b) The transformer shall be complete with a grounded and fused secondary and dual primary fuses.

5) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/close/stop push buttons.

a) "OFF" position disables local and remote operation.

b) "REMOTE" position enables open/close/stop control from a remote source.

6) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

7) Provide OPEN/CLOSE/STOP indicating lights.

8) Provide thermal overload and single phasing protection of the motor.

9) Provide a set of dry contacts to remotely indicate that the actuator is available for remote operation.

10) The actuator circuit boards shall be rated for high temperature service, minimum 55°C.

11) Provide electrical interlocks as shown on the Contract Drawings.

12) For monitoring of the actuator, provide a set of SPDT dry contacts. The monitor relay shall indicate that the actuator is available for remote operation.

b. Remote Mounted Control Panels:

1) Provide a remote mounted control panel for each electric actuator where:

a) Required by the valve location, as specified herein; or

b) Shown on the Contract Drawings.

2) Enclosure: NEMA 4X, Type 316 stainless steel.

3) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/stop/close push buttons.

a) "REMOTE" position enables open/close/stop control from remote source.

b) "OFF" position disables local and remote operation. Provide contact when switch is in remote position for remote indication.

4) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

5) Provide OPEN/CLOSE/STOP indicating lights and 0% to 100% position indication on liquid crystal display window.

BB. Electric Actuators (Modulating)

1. General:

a. Electric actuator for modulating service shall conform to the requirements of AWWA C542.

b. Application Criteria:

1) Ambient Temperature Rating: -20°F to +150°F.

2) Ambient Humidity: 100%.

3) Maximum design differential pressures and forward/reverse flows applicable to the valves:

a) Refer to Schedule 40 05 53-1, located after the "End of Section" designation.

b) For the service conditions of buried piping on which the actuated valve is installed, refer to Section 33 06 01 – Schedule for Buried Piping.

c) For the service conditions of exposed piping on which the actuated valve is installed, refer to Section 40 06 01.

4) Opening and Closing Speeds: 6-inches per minute

5) Power Supply: 480V, 3 phase, 60 Hz.

6) Control Voltage: 120 volts, single phase, 60 Hz.

7) Torque: Per valve manufacturer.

8) Duty Cycle: Continuous (minimum 1200 starts/stops per hour), unless otherwise specified herein.

9) Accepts 4 to 20 mA input to positioner.

10) Each electric actuator shall be equipped with a handwheel for manual operation.

a) The handwheel shall be connected such that operation by the motor will not cause the handwheel to rotate.

b) Should power be returned to the motor while the handwheel is in use, design of the unit shall prevent transmission of the motor torque to the handwheel.

11) The actuator shall be operable with handwheel or chainwheel even after the electric motor has been disengaged and removed for repairs.

c. Remote Control Panels:

1) Provide separate remote control panels for all valves with electric actuators located ≥ 6.00 ft. above the operating floor.

2) The separate remote control panels shall be provided with separate push-button stations.

3) The separate remote control panels shall be installed approximately 5 ft. above the operating floor at an approved location.

4) Electrical wiring shall be modified as required for the remote location of the control panels.

d. Sizing of each electric actuator shall be coordinated with the valve manufacturer who shall furnish the valve and the electric actuator as a unit.

e. The electric actuators shall be suitable for the valve orientation as shown on the Contract Drawings.

f. All electrical components shall conform to the area classification shown on the Contract Drawings.

2. Materials and Construction:

a. Electric Motor:

1) Motor shall be in accordance with the requirements of Section 26 05 91 - Low Voltage Electric Motors.

2) Motors shall be specifically designed for valve actuator service. It shall have a maximum continuous total temperature rating of 70°C.

3) The motor shall be sized for at least 1.5 times the actuator torque requirement.

b. Actuator Gearing:

1) Housing: Die-cast aluminum.

2) Close coupled to electric motor.

3) Input Shaft Gearing: Spur or bevel gear assembly.

4) Output Shaft Gearing: Self-locking worm gears with minimum gear backlash to prevent valve disc chatter or vibration. The gearing shall be rated for at least twice the required actuator torque.

5) All gearing shall be of hardened alloy steel or a combination of hardened alloy steel and alloy bronze, accurately cut by hobbing machine.

6) Lubrication: Oil bath or grease.

7) Bearings: Ball or roller with a minimum B-10 life of 100,000 hrs.

8) Input Shaft: Hardened alloy steel.

9) Provide mechanical stops adjustable to ±5° at each end of travel.

10) Provide mechanical position indication.

c. Limit Switches:

1) Each actuator shall be provided with "end of travel" limit switches to allow control of desired end position for each direction of travel.

2) Travel stops shall be threaded and of Type 316 stainless steel to allow adjustment at each end of actuator stroke.

3) Open and close limit switches shall be geared to the drive mechanism and in step at all times, whether the unit is operated electrically or manually and whether or not the actuator is powered by the 3-phase power supply. Friction devices or set-screw arrangements shall not be used to maintain the setting.

4) Limit switch gearing shall be appropriately lubricated.

5) The driven mechanism shall be totally enclosed to prevent entrance of foreign matter or loss of lubricant.

6) Each actuator shall be provided with four auxiliary contacts. Two contacts shall close and two contacts shall open at a desired end position for each direction of travel.

7) Switches shall be rated 5A or 10A at 120V, as applicable for the specified equipment.

d. Torque Switches:

1) Adjustable torque switches shall be provided with each valve actuator.

a) The torque switches shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches or other devices.

2) Torque switches shall be wired to de-energize the valve actuator motor in the event excessive torque is developed during either direction of travel.

3) It shall be possible to select the torque switches to control the open and close limit positions in either direction of valve travel.

4) Dry contacts, 5A or 10A, 120V, as applicable for the specified equipment, shall be provided for remote high torque alarm for automatically controlled valves.

3. Appurtenances:

a. Handwheel and Chainwheel:

1) Provide each electric actuator with a handwheel.

2) Maximum Effort on Rim of Handwheel:

a) For seating or unseating Load: ≤ 80 lbf.

b) For Running Load: ≤ 60 lbf..

3) The handwheel shall have an arrow and the word "OPEN" or "CLOSE" indicating required rotation.

4) The handwheel shall operate in the clockwise direction to close.

5) Chain Operators:

a) All valves ≥ 6.00 ft. above the operating floor level shall be equipped with chain operators.

6) Handwheels and chain operators shall conform to the requirements specified separately herein.

b. All fasteners shall be Type 316 stainless steel.

4. Controls:

a. Provide each electric actuator with controls:

1) Provide controls in a separate compartment integral with the actuator.

2) Enclosure: NEMA 4X, unless NEMA 7 is required for duty in the actuator location.

3) Starter:

a) Provide a combination reversing magnetic starter with circuit breaker and disconnect switch.

b) Provide a fused disconnect switch in a separate enclosure that is rated for the same area of classification.

c) Housing:

(1) For nonhazardous areas: NEMA 4X, Type 316 SS enclosure.

(2) For hazardous areas: Class 1 Division 2 cast aluminum housing.

4) Control Power Transformer:

a) Provide a transformer to transform the rated three phase, 60 Hz power to 120V, single phase.

b) The transformer shall be complete with a grounded and fused secondary and dual primary fuses.

5) Provide LOCAL/OFF/REMOTE Selector Switch.

a) "LOCAL" position provides operation from open/close/stop push buttons.

b) "OFF" position disables local and remote operation.

c) "REMOTE" position enables open/close/stop control from a remote source.

6) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

7) Provide OPEN/CLOSE/STOP indicating lights.

8) Provide and 0% to 100% position indication on a liquid crystal display window.

9) Provide thermal overload and single phasing protection of the motor.

10) Provide a set of dry contacts to remotely indicate that the actuator is available for remote operation.

11) The actuator circuit boards shall be rated for high temperature service, minimum 55°C.

12) Provide electrical interlocks as shown on the Contract Drawings.

13) For monitoring of the actuator, provide a set of SPDT dry contacts. The monitor relay shall indicate that the actuator is available for remote operation.

b. Position controller:

1) Provide each electric actuator for modulating service with a position controller.

2) The position controller shall receive a 4-20 mA analog control signal and position the valve in proportion to this signal.

3) The controller shall have adjustments for duty cycle, band width, span, and zero.

4) On loss of control signal, the valve shall remain in its last position.

5) Provide for adequate cooling of the controller based on the service location of the actuator.

c. Position transmitter:

1) Provide each electric actuator for modulating service with a position transmitter capable of producing a 4-20 mA output signal.

2) Unit shall be a standard slidewire (potentiometer) position transducer which shall provide an output corresponding to 0% to 100% of travel.

3) Accuracy shall be ±1% of scale.

4) Transmitter shall include an integral temperature-compensated, constant-current source for slidewire excitation.

5) Transmitter shall be integral to the actuator.

d. Remote Mounted Control Panels:

1) Provide a remote mounted control panel for each electric actuator where:

a) Required by the valve location, as specified herein; or

b) Shown on the Contract Drawings.

2) Enclosure: NEMA 4X, Type 316 stainless steel.

3) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/stop/close push buttons.

a) "REMOTE" position enables open/close/stop control from remote source.

b) "OFF" position disables local and remote operation. Provide contact when switch is in remote position for remote indication.

4) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

5) Provide OPEN/CLOSE/STOP indicating lights and 0% to 100% position indication on liquid crystal display window.

CC. Pneumatic Actuators (Open/Close):

1. General:

a. Pneumatic actuators for open/close service shall conform to the requirements of AWWA C541.

b. Application Criteria:

1) Ambient Temperature Rating: -20°F to +150°F.

2) Ambient Humidity: 100%.

3) Maximum design differential pressures and forward/reverse flows applicable to the valves:

a) Refer top Schedule 40 05 53-1, located after the "End of Section" designation.

b) For the service conditions of buried piping on which the actuated valve is installed, refer to Section 33 06 01 - S.

c) For the service conditions of exposed piping on which the actuated valve is installed, refer to Section 40 06 01.

4) Opening and Closing Speeds: 6 inches per minute.

5) Pneumatic Air Supply: 80 psig.

6) Solenoid Voltage: 120 VAC, single-phase, 60 Hertz.

7) Control Voltage: 120 VAC, single phase, 60 Hz.

8) Torques: Per valve manufacturer.

9) Duty Cycle: ≥ 6 starts / hr.

10) Each electric actuator shall be equipped with a handwheel for manual operation.

a) The handwheel shall be connected such that operation by the vane will not cause the handwheel to rotate.

b) Should hydraulics be returned to the vane while the handwheel is in use, design of the unit shall prevent transmission of the pneumatic torque to the handwheel.

11) The actuator shall be operable with handwheel or chainwheel even after the vane has been disengaged and removed for repairs.

c. Remote Control Panels:

1) Provide separate remote control panels for all valves with electric actuators located ≥ 6.00 ft. above the operating floor.

2) The separate remote control panels shall be provided with separate push-button stations.

3) The separate remote control panels shall be installed approximately 5 ft. above the operating floor at an approved location.

4) Electrical wiring shall be modified as required for the remote location of the control panels.

d. Sizing of each pneumatic actuator shall be coordinated with the valve manufacturer who shall furnish the valve and the electric actuator as a unit.

e. The electric pneumatic shall be suitable for the valve orientation as shown on the Contract Drawings.

f. All electrical components shall conform to the area classification shown on the Contract Drawings.

2. Materials and Construction:

a. Solenoid Valve:

1) Provide each pneumatic actuator with the following style of solenoid:

a) When the solenoid valve can be mounted to the actuator: Provide a "NAMUR"-style solenoid.

b) When the solenoid valve cannot be mounted to the actuator: Provide a body ported solenoid valve mounted to a Type 316 stainless steel bracket.

2) The solenoid valve shall be energized to open and de-energized to close.

3) Cv: < 0.75.

4) Solenoid valve shall include:

a) One (1) ¼-in. NPT air supply port,

b) Two (2) ¼-in. NPT exhaust ports

c) One (1) 120 VAC, IP65, NEMA IV, 2-position coil, pneumatic manual override/

d) Two (2) exhaust speed controls.

b. Shaft and vane:

1) Actuator shaft and vane shall be a single machined part with square output shafts on both ends.

2) Shaft and vane shall be either stainless steel or SG iron, zinc plated.

c. Lip seals:

1) Shall be dual opposed injection molded polyurethane and must seal the shaft from the air supply.

2) Stainless steel expanders shall be fitted beneath the vane lip seals to ensure continual seal-to-case contact.

3) No type of O-ring type vane seals shall be acceptable.

d. Housing:

1) Provide either:

a) Pressure die cast zinc alloys; or

b) Sand cast LM25 grade aluminum

2) Externally coat with corrosion resistant baked epoxy enamel paint.

3) Actuator housing internal surfaces shall be coated with either corrosion resistant baked epoxy enamel paint or polytetrafluoroethylene impregnated.

4) Housing: Die-cast aluminum.

5) Close coupled to electric motor.

6) Input Shaft Gearing: Spur or bevel gear assembly.

7) Output Shaft Gearing: Self-locking worm gears with minimum gear backlash to prevent valve disc chatter or vibration. The gearing shall be rated for twice the required actuator torque.

8) All gearing shall be of hardened alloy steel or a combination of hardened alloy steel and alloy bronze, accurately cut by hobbing machine.

9) Lubrication: Oil bath or grease.

10) Bearings: Ball or roller with a minimum B-10 life of 100,000 hrs.

11) Input Shaft: Hardened alloy steel.

12) Provide mechanical stops adjustable from 0° to 90° at each end of travel.

e. Limit Switches:

1) Each actuator shall be provided with "end of travel" limit switches to allow control of desired end position for each direction of travel.

2) travel stops shall be threaded and of Type 316 stainless steel to allow adjustment at each end of actuator stroke.

3) Open and close limit switches shall be geared to the drive mechanism and in step at all times, whether the unit is operated electrically or manually and whether or not the actuator is powered by the 3-phase power supply. Friction devices or set-screw arrangements shall not be used to maintain the setting.

4) Limit switch gearing shall be appropriately lubricated.

5) The driven mechanism shall be totally enclosed to prevent entrance of foreign matter or loss of lubricant.

6) Each actuator shall be provided with four auxiliary contacts. Two contacts shall close and two contacts shall open at a desired end position for each direction of travel.

7) Switches shall be rated 5A or 10A at 120V, as applicable for the specified equipment.

f. Torque Switches:

1) Adjustable torque switches shall be provided with each valve actuator.

a) The torque switches shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches or other devices.

2) Torque switches shall be wired to de-energize the valve actuator motor in the event excessive torque is developed during either direction of travel.

3) It shall be possible to select the torque switches to control the open and close limit positions in either direction of valve travel.

4) Dry contacts, 5A or 10A, 120V, as applicable for the specified equipment, shall be provided for remote high torque alarm for automatically controlled valves.

g. Handwheel and Chainwheel:

1) Provide each electric actuator with a handwheel.

2) Maximum Effort on Rim of Handwheel:

a) For seating or unseating Load: ≤ 80 lbf.

b) For Running Load: ≤ 60 lbf..

3) The handwheel shall have an arrow and the word "OPEN" or "CLOSE" indicating required rotation.

4) The handwheel shall operate in the clockwise direction to close.

5) Chain Operators:

a) All valves ≥ 6.00 ft. above the operating floor level shall be equipped with chain operators.

6) Handwheels and chain operators shall conform to the requirements specified separately herein.

h. All fasteners shall be Type 316 stainless steel.

3. Controls:

a. Provide each electric actuator with controls:

1) Provide controls in a separate compartment integral with the actuator.

2) Enclosure: NEMA 4X, unless NEMA 7 is required for duty in the actuator location .

3) Starter:

a) Provide a combination reversing magnetic starter with circuit breaker and disconnect switch.

b) Housing:

(1) For nonhazardous areas: NEMA 4X, Type 316 SS enclosure.

(2) For hazardous areas: Class 1 Division 2 cast aluminum housing.

4) Control Power Transformer:

a) Provide a transformer to transform the rated three phase, 60 Hz power to 120V, single phase.

b) The transformer shall be complete with a grounded and fused secondary and dual primary fuses.

5) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/close/stop push buttons.

a) "OFF" position disables local and remote operation.

b) "REMOTE" position enables open/close/stop control from a remote source.

6) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

7) Provide OPEN/CLOSE/STOP indicating lights.

8) Provide thermal overload and single phasing protection of the motor.

9) Provide a set of dry contacts to remotely indicate that the actuator is available for remote operation.

10) The actuator circuit boards shall be rated for high temperature service, minimum 55°C.

11) Provide electrical interlocks as shown on the Contract Drawings.

12) For monitoring of the actuator, provide a set of SPDT dry contacts. The monitor relay shall indicate that the actuator is available for remote operation.

b. Remote Mounted Control Panels:

1) Provide a remote mounted control panel for each electric actuator where:

a) Required by the valve location, as specified herein; or

b) Shown on the Contract Drawings.

2) Enclosure: NEMA 4X, Type 316 stainless steel.

3) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/stop/close push buttons.

a) "REMOTE" position enables open/close/stop control from remote source.

b) "OFF" position disables local and remote operation. Provide contact when switch is in remote position for remote indication.

4) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

5) Provide OPEN/CLOSE/STOP indicating lights and 0% to 100% position indication on liquid crystal display window.

DD. Appurtenances for Exposed Metallic Valves

1. Provide appurtenances for all exposed valves of metallic construction, unless otherwise specified.

2. Provide handwheels for all valves located < 6 ft. above the operating floor.

a. All handwheels shall conform to the applicable AWWA Standards.

b. Material of Construction: Ductile iron or cast aluminum.

c. Arrow indicating direction of opening and word “OPEN” shall be cast on the trim of the handwheel.

d. Maximum Handwheel Diameter: 30 inches.

3. Provide chain operators for all valves located ≥ 6 ft. above the operating floor.

a. Chains shall extend to three feet above the operating floor.

b. A ½-in. stainless steel hook bolt shall be provided to keep the chain out of the walking area.

c. Materials of Construction:

1) Chain: Type 316L stainless steel.

2) Chain wheel: Recessed groove type made out of Type 316 stainless steel.

3) Guards and Guides: Type 316L stainless steel.

d. Chain Construction: Chain shall be of welded link type with smooth finish. Chain that is crimped and has links type with exposed ends that may cause injury shall not be acceptable.

e. Provide geared operators where required to position chain wheels in vertical position.

4. Extension stems and floorstands:

a. Provide where indicated, necessary, or required.

b. Sizing of the complete lifting mechanism shall conform to the applicable requirements of AWWA C501.

c. Bench and Pedestal Floorstands:

1) The valves requiring extension stems shall be provided with bench or pedestal floorstands as indicated.

2) Type: Heavy-duty with tapered roller bearings enclosed in a weatherproof housing, provided with positive mechanical seals around lift nut and pinion shaft to prevent loss of lubrication and to prevent moisture from entering the housing. A lubrication fitting shall be provided for grease. The base shall be machined.

d. Extension Stems:

1) Maximum Slenderness Ratio (L/R): 100.

2) Minimum Diameter: 1.5 in.

3) Threads: ACME.

4) A top nut and a bottom coupling shall be provided on the stem with required pins and set screws.

e. Stem Guides:

1) Maximum Stem Length between Guides: 7 feet.

2) Stem guides shall be adjustable in two directions.

f. Materials of Construction:

1) Floorstand Housing: Cast-iron, ASTM A126, Class B.

2) Lift Nut: Cast bronze, ASTM B 98.

3) Wall Brackets for Floorstands: Type 316L stainless steel.

4) Stem and Stem Couplings: Type 316 stainless steel.

5) Top Nut, Bottom Coupling and Hardware: Type 316 stainless steel.

6) Stem Guides: Type 316 cast stainless steel.

7) Grease Fitting: Stainless steel.

8) All Bolting: Type 316 stainless steel.

g. Stem Covers:

1) Shall be furnished with clear butyrate plastic or grade 153 Lexan pipe stem covers.

2) The cover shall be furnished with a cast adaptor for mounting cover to bench and floor stands.

3) Stem cover shall be designed and furnished with gasketing and breathers to eliminate water intrusion into operator and condensation within the cover.

4) The cover shall be provided with Mylar tape with legible markings showing the gate position at one inch intervals and open/close limits of the gates.

5. Crank Operator:

a. Crank operator shall be removable and fitted with a rotating handle.

b. Maximum Radius of Crank: 15 in..

c. Materials:

1) Crank: Cast iron or ductile iron.

2) Handle: Type 304 stainless steel.

3) Hardware: Type 304 stainless steel.

EE. Appurtenances for Buried Metallic Valves

1. Wrench Nuts:

a. Wrench nuts shall be provided on all buried valves and shall be of nominal 2-in. size conforming to AWWA C500.

b. Arrow indicating direction of opening the valve shall be cast on the nut along with the word "OPEN".

c. Material: Ductile iron.

d. The nut shall be secured to the stem by mechanical means.

2. T-Handle Operating Wrenches:

a. Contractor to provide from valve manufacturer.

b. Provide T-Handle operating wrenches in lengths to permit operation of all valves by operators.

c. Furnish one (1) wrench per type and size of each buried metallic valve installed.

3. Extension Stems for Non-Rising Stem Gate Valves and Quarter Turn Buried Valves:

a. Extension stems shall be provided to bring the operating nut to 6-in. below the box cover.

b. Minimum Size and Material: Same as valve stem.

c. Maximum Unsupported Length: 3 ft.

4. Valve Boxes:

a. Valve boxes shall be as indicated and as required.

b. Type: Heavy duty, suitable for highway loading, telescopic, and adjustable.

c. Material: Cast or ductile iron.

d. Coating: Two coats of asphalt varnish conforming to FS TT-C494B.

e. Marking: As required for service.

FF. Anchor and Miscellaneous Mounting Bolts

1. All bolts, nuts and washers furnished for connection of the valve appurtenances to the concrete structure or other structural members shall be furnished by the valve equipment manufacturer, and shall be of ample size and strength for the purpose intended.

2. Anchor bolts shall be hooked or adhesive type.

3. All bolts and washers shall be of Type 316 stainless steel and nuts shall be UNS S21800 alloy stainless steel and shall conform to the requirements of ASTM A194 Grade 8SA.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General:

1. Interior Glass Lining:

a. Provide interior glass lining for valves where:

1) Glass lining is specified herein; and/or

2) Glass lining is necessary and/or required for the service conditions; and/or

3) Glass lining is specified for the connecting pipe as specified in Section 33 06 01 - Schedule for Buried Piping, and/or Section 40 06 01 - Schedule for Exposed Piping

4) Glass lining is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

b. Glass lining shall be applied in two layers, each separately fired and matured at minimum 1,400°F.

c. The bond of glass lining with the cast iron body shall withstand a metal yield point of 0.001 inch/inch without causing any damage to the glass lining.

d. Total Thickness: 0.008-in. to 0.012-in.

e. Hardness: ≥ 5 MOHS.

f. Density: 2.5 to 3.0 g/cm^3.

g. Glass lining shall withstand an instantaneous thermal shock at 350°F without crazing, blistering, or spalling.

h. The lining shall be resistant to corrosion for solutions at 125°F over a pH range from 3 to 10 inclusive.

i. Visual appearance of the glass lining shall be similar to bright and clean opaque window glass. Surface gloss shall be maintained when immersed in a 8% sulfuric acid solution at 148°F for 10 min.

2. Stainless Steel:

a. Fabricated stainless steel items shall be cleaned and descaled in accordance with ASTM A380, and shall be as follows:

1) All stainless steel welded fabricated items shall be passivated after manufacture by immersion in a pickling solution of 6% nitric acid and 3% hydrofluoric acid.

a) Temperature and detention time shall be sufficient for removal of oxidation and ferrous contamination without etching of surface.

b) Perform a complete neutralizing operation by immersion in a trisodium phosphate rinse followed by clean water wash.

2) The welds shall be scrubbed with the same pickling solution or pickling paste and stainless steel wire brushes after fabrication to remove weld discoloration, and then shall be neutralized and washed clean.

b. Anti-seize Compound:

1) For all stainless steel bolting, anti-seize compound, graphite free, shall be used to prevent galling.

2) Strength of bolting shall not be affected by anti-seize compound.

3. Painting of Exposed Valves and Appurtenances:

a. Exterior steel, cast-iron, and ductile iron surfaces except machined or bearing surfaces of all exposed valves and appurtenances shall be finish painted in the shop.

b. The surface preparation, priming, finish painting, and field touch-up painting shall conform to Section 09 91 00 - Painting.

4. Painting of Buried Valves:

a. Exterior steel, cast-iron, and ductile iron surfaces except machined or bearing surfaces of all buried valves shall be shop-painted with two coats of asphalt varnish conforming to FS TT-C 494B.

5. Limit Switches:

a. Where shown on the Contract Drawings and/or specified, all control-closing swing check valves shall be provided with limit switches as specified and/or as shown in the contract documents.

6. Nameplates:

a. All valves shall be provided with Type 316 stainless steel nameplates attached with Type 316 stainless steel screws.

b. The nameplates shall have engraved letters and shall include the following information as a minimum:

1) Valve size.

2) Pressure and temperature ratings.

3) Date of manufacture.

4) Manufacturer's name and address.

7. Identification:

a. The valves shall be provided with identification conforming to the requirements of Section 40 05 97 - Identification for Process Equipment.

B. Gate Valves (Metal-Seated):

1. Interior Coating:

a. All metal-seated gate valves shall be coated inside.

b. The steel, cast-iron, and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

C. Plug Valves (Liquid and Digester Gas Service):

1. Interior Coating:

a. All plug valves shall be coated inside.

b. If the pipe connecting to the plug valve, as specified in Section 33 06 01 - Schedule for Buried Piping, and/or Section 40 06 01 - Schedule for Exposed Piping, shall not have glass lining, the interior of the plug valve shall be coated as follows:

1) The steel, cast-iron, and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

c. If the pipe connecting to the plug valve, as specified in Section 33 06 01 - Schedule for Buried Piping, and/or Section 40 06 01 - Schedule for Exposed Piping, shall have glass lining, the interior of the plug valve shall be glass lined as follows:

1) The interior of the valve body shall have glass confirming to the requirements specified herein.

D. Check Valves (Liquid Service):

1. Interior Coating:

a. All swing check valves for liquid service shall be coated inside.

b. The steel, cast-iron and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

E. Automatic Pressure Reducing Valves:

1. Interior Coating:

a. All automatic pressure reducing valves shall be coated inside.

b. Epoxy coat steel, cast-iron, and ductile iron surfaces in accordance with AWWA C550.

F. Telescopic Valves:

1. All fabricated stainless steel items shall be pickled and cleaned.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Gate Valves (Metal-Seated):

1. Test all metal-seated gate valves in accordance with the requirement of AWWA C500.

2. All shop tests shall be witnessed by a registered professional engineer who may be an employee of the manufacturer. The performance test reports shall be certified, signed, and sealed by the professional engineer.

3. The following shop tests shall also be witnessed by two (2) representatives of DEP:

   a. All gate valves (metal-seated) included in Schedule 40 05 53-1, located after the "End of Section" designation.

   b. Quantity of gate valve (metal-seated) shop tests that shall be witnessed by representatives of the DEP:

      1) The shop tests for each individual gate valve (metal-seated) shall be witnessed.

4. The Contractor shall bear all costs for travel, lodging, and boarding of these representatives, for the shop witness tests. The Contractor shall bear all similar costs if the equipment must be retested.

5. In the event that the manufacturer is unable to demonstrate that a valve meets the test requirements, the deficient equipment shall be rejected. All rejected equipment shall be adjusted, modified or replaced and retested at no additional cost to the City.

6. Shop test all metal-seated gate valves in accordance with the requirement of AWWA C500.

B. Plug Valves (Liquid Service):

1. Perform shop tests on all plug valves for liquid service.

2. Open/Close Test:

   a. Each plug valve (with the actuator mounted directly on the valve) shall be shop operated three (3) times from the fully closed to the fully opened position and the reverse under a no-flow condition.

3. Leakage Tests:

   a. Plug valves shall be given a leakage test at the design working and operating pressures.

   b. During the test, the plug valves shall be drip-tight.

   c. Duration:

      1) For plug valves < 20-in.: 5 min.

      2) For plug valves ≥ 20-in.: 10 min.

   d. The tests shall be repeated with pressure in the opposite direction.

4. Hydrostatic Test:

a. All plug valve bodies shall be subjected to an internal hydrostatic pressure equivalent to twice the rated pressure.

b. During the hydrostatic test, there shall be no leakage through the metal, end joints, or shaft seal, nor shall any part be permanently deformed.

c. The duration of the hydrostatic test shall be sufficient to allow visual examination for leakage.

d. Duration:

1) For plug valves ≤ 8-in.: 1 min.

2) For plug valves 8-in. through 20 in.: 3 min.

3) For plug valves > 20 in.: 10 min.

5. Glass Lining Continuity Test:

a. The glass lining test applies only to plug valves for liquid service which have glass lining.

b. Each plug valve shall be tested for continuous coverage of glass lining by a low voltage wet sponge holiday detection unit.

c. Number of pinholes permitted in each plug valve lining: ≤ 2.

C. Check Valves (Liquid Service):

1. Shop test all swing check valves for liquid service in accordance with the requirements of AWWA C508.

a. Permitted leakage at design working and operating pressures: 0.

D. Automatic Pressure Reducing Valves:

1. Perform shop tests on all automatic pressure reducing valves.

2. Hydrostatic Test:

a. Test each assembled valve (except control piping) at 1.5 times the rated working pressure.

b. Duration: 5 min.

3. Leakage Test:

a. Test each valve for leakage at the rated working pressure against closed valve.

b. Duration: 15 minutes

c. Permitted leakage: 0.

4. Functional Test:

a. Verify specified performance over full range of operating conditions specified in schedule 40 05 53-3, located after the "End of Section" designation.

E. Electric Actuators (Open/Close):

1. Shop test each actuator in accordance with the requirements of AWWA C542.

F. Electric Actuators (Modulating):

1. Shop test each actuator in accordance with the requirements of AWWA C542.

G. Pneumatic Actuators (Open/Close):

1. Shop test each actuator in accordance with the requirements of AWWA C541.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Install valves in complete accordance with the manufacturer's printed instructions and the approved Shop Drawings.

B. All valves shall be installed plumb and level. The valves shall be free from distortion and strain caused by misaligned piping, equipment or other causes.

C. All valves shall be installed so that operating handwheels or levers may be conveniently turned from operating floor without interfering with access, and shall be as approved by the Engineer. Chain operators shall be oriented out of the way from the walking areas.

D. For motor-operated valves located less than 6.00 ft. above the operating floor, the orientation of the motor actuator shall permit easy access to the push buttons and the handwheel.

E. For buried valves:

1. The valve boxes shall be set plumb and centered.

2. Carefully tamp to a lateral distance of 4 ft. on all sides of the valve box.

3. If the undisturbed trench face is less than 4 ft. from the valve box in any direction, carefully tamp to the undisturbed trench face.

F. Installation of plug valves in sludge lines:

1. Plug valves in horizontal lines shall be installed with the stem horizontal. The plugs shall be on top when open and on pressure side when closed.

2. Plug valves in vertical lines shall be installed with the plug at the top when closed.

G. Provide identification accordance with the requirements of Section 40 05 97 - Identification for Process Equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. All parts and components shall be adjusted as required to provide correct operation.

B. A functional field test of each valve shall be conducted in the presence of the Engineer to demonstrate that each part and all components function together correctly.

3.04 STARTUP / DEMONSTRATION

A. Where specified herein, the Contractor shall provide the services of qualified factory-trained service technicians to check and approve the installation.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Provide field touch up painting in accordance with the requirements of Section 09 91 00 - Painting.

END OF SECTION

SCHEDULE 40 05 53-1
VALVE SCHEDULE, VALVES 4 INCH AND LARGER(1)

Valve Tag (No.):	Service:	Size: (in.)	Type:	Material:	Actuator:	End Type:	Remarks:
	Water	2	Ball	Steel	N/A	Flanged	

Notes:
(1) Only valves to be permanently provided as part of the Work are included in Schedule 40 05 53-1.

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Work Included:

1. The Contractor shall furnish, install and test all bonneted knife gate valves and accessories as shown on the Contract Drawings and as specified herein.

2. The Contractor shall provide bonneted knife gate valves in accordance with this specification and as indicated in the schedules included at the end of this specification.

3. Bonneted knife gate valves shall be constructed of materials specified in Section 2.02 of this specification. They shall be bonneted, extended body style conforming to the standards of AWWA-C520, latest edition, and shall meet the general design requirements set forth in Section 1.06 and the specific design and operating requirements described in this specification and as shown on the Contract Drawings.

4. Bonneted Knife Gate Valve shall be of the unidirectional design with seating in the direction of flow.

5. The inside diameter of valve body and seat for all bonneted knife gates shall be equal to, or larger than the ID of the adjacent pipe.

6. Valves shall be furnished complete with all accessories, valve actuators, special tools and spare parts as specified herein, as shown on the Contract Drawings and as required for a complete installation.

B. The following index of this Section is presented for convenience:

C.

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	8
1.09	Spare Parts, Special Tools, and Supplies	8
1.10	Warranty	9
PART 2	PRODUCTS	9
2.01	Manufacturers	9
2.02	Materials / Equipment	9
2.03	Fabrication / Assembling / Finishes	22
2.04	Source Quality Control / Shop Tests	23
PART 3	EXECUTION	24
3.01	Examination / Preparation	24

3.02 Installation.....24
3.03 Field Testing / Quality Control 24
3.04 Startup / Demonstration 26
3.05 Adjusting / Protection / Cleanup.....26

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 Painting

B. Section 40 05 06 Couplings, Adapters, and Specials for Process Piping

C. Section 40 05 22 Steel and Stainless-Steel Pipe

D. Section 40 05 97 Piping and Equipment Identification

E. Section 40 06 01 Schedule for Exposed Piping

1.04 REFERENCES

A. Unless otherwise specified, the work of this Specification shall conform to the applicable portions of the following:

1. American Society of Mechanical Engineers (ASME) Pressure Vessel Section VIII Division1
2. ASME Pressure Vessel Section IX-Welding
3. American Water Works Association (AWWA)
4. American Society for Testing and Materials (ASTM)
5. American Gear Manufacturers Association (AGMA)
6. National Electrical Manufacturers Association (NEMA)
7. AWWA National Sanitary Foundation (NSF) Standard ANSI 61

1.05 DESCRIPTION

A. Flat flanged bonneted knife gate valves (30-inch) furnished under this specification will be used for isolation of downstream components located in the Intake and Control Structure as shown in the Contract Drawings. Bonneted Knife Gate Valves shall be capable of closure under the maximum head conditions.

B. Electric operators for the 30-inch knife gate valves will be located on the Upper Operating Level of the High-Level Outlet as shown in the Contract Drawings.

C. General Requirements:

1. Knife gate valves shall be provided with .125 thick Type 316 stainless steel nameplates attached with Type 316 stainless steel screws. The nameplates shall have engraved ¼-inch letters or larger and shall include the following information as a minimum:
   a. Valve size
   b. Valve Serial number
   c. Pressure and temperature ratings
   d. Date of manufacture
   e. Manufacturer's name and address
2. Certified material test reports indicating physical and mechanical properties and heat treatment (as applicable) shall be furnished for all major components as identified by the Engineer.
3. Detailed manufacturing production drawings shall be provided to the Owner upon completion of the project.
4. The QA requirements as defined by Section 01 43 10 Quality Assurance Inspection must be followed.
5. Traceability to original source of steel plate fabrication shall be maintained for all major valve and actuator components as identified by the Engineer. All such components shall be traceable to the plate fabrications and/or lot numbers.

1.06 QUALITY ASSURANCE

A. All knife gate valves provided under this Section shall be supplied by a single manufacturer.

B. Valves are to be designed and tested for unconstrained service and are to be provided with non-integral flat face flanges either side of the valve body. Raise flange faces are not acceptable.

C. To verify that the valve is properly designed a finite element stress analysis should be part of the submittal, showing that the valve will not be stressed beyond the yield point at the shell test pressure as previously described.

D. Shop inspections shall be made by NYC DEP representatives. The Contractor shall give at least 45 days' notice to the Engineer prior to the beginning of any work and testing so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the work.

E. Such inspection shall include, but not be limited to, casting and machining inspection, review of certified material test reports, witness of hardness checks, traceability check, witness of assembly, and witness shop testing. Prior to manufacturing, the valve manufacturer shall supply the following information on suppliers of castings, machining, fabrications, and other components: item(s)

furnished, company name and address, contact name, telephone and fax number. The NYC DEP reserves the right to visit any or all suppliers and conduct inspection at their facilities.

F. Inspectors shall have the authority to reject any material or work which does not meet the requirements of the Contract Drawings or the specifications.

G. Inspection at the shop is intended as a means of facilitating the work and avoiding errors but is expressly understood that it will in no way relieve the Contractor from the responsibility for furnishing proper materials or workmanship.

H. Certified Material Test Reports indicating physical and mechanical properties and heat treatment (as applicable) shall be furnished for all components identified by the Engineer.

I. Material Traceability to original heat numbers shall be maintained for all major valve components and samples shall be provided for the items identified by the Engineer.

1. The transfer of mill marks to maintain material traceability shall be performed in the presence of the DEP inspector.

2. Material traceability for all valve assemblies shall be provided in the following form:

3. A Complete Quality Control Material Traceability Data Package shall be provided for each finished Valve Assembly. The data package shall identify the component with associated heat number and shall have attached the applicable Certified Material Test Report (CMTR). Data shall be provided for each Valve Assembly supplied in the form of an “As-Built” assembly drawing with a detailed bill of materials and parts list. Thereon, component material designations, material heat nos., heat treatment nos. (as applicable), and additional in-process Q/C inspection data shall be included (i.e. weld maps, operational tests, leakage tests, hydro tests, paint tests, etc.)

4. Components identified as requiring material traceability shall be provided with unique product markings in the form of a stamped-on heat number, serial number, etc. that is traceable to the applicable CMTR.

5. Material samples shall be supplied for the identified items and shall be provided in accordance with the applicable material specification (ASTM, etc.) and shall be provided with unique product markings in the form of a stamped-on heat number, serial number, etc. that is traceable to the applicable CMTR.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. The Contractor shall obtain from the equipment manufacturer and submit shop drawings, operation and maintenance manuals, working drawings, special tools list, spare parts list, and shop test reports as specified herein. The Contractor shall submit all detail and assembly drawings, computations of equipment design and

installation drawings and procedures to the Engineer for approval. The drawing shall show the dimensions and tolerances, bill of materials with all part numbers, material specifications and pertinent references to fabrication, testing processes, etc. All submittals shall contain complete material certification documents from manufacturer for all material components. Material certification documents shall be in accordance with section 1.

B. Shop Drawings: submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures. Shop drawings shall include, but not be limited to:

1. Valve specifications and data sheets identifying all materials used and methods of fabrication.
2. Complete assembly, layout and installation drawings with clearly marked dimensions.
3. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
4. Exploded 3-dimensional drawing(s) including the parts list.
5. Weights of major component parts assembled weight of subassemblies and approximate total shipping weight.
6. A list of the quantity and type of recommended lubricants, spare parts and special tools.

C. Operation and maintenance manuals: submit operation and maintenance manuals in accordance with the procedures and requirements set forth in Section 01 78 25 Operation and Maintenance Manuals. Generalized manuals will not be acceptable. Documentation for instrumentation and control panels furnished under this

D. Special tools and spare parts list: provide special tools and spare parts list as recommended by the equipment manufacturer to disassemble, service, repair and adjust the valves. Comply with the requirements of General Conditions, Article 12 and Section 01 78 10 Project Closeout.

E. Functional test reports: submit shop and field test reports in accordance with the requirements of the General Conditions.

F. Material test reports representing all major components of valves and operators shall be submitted. All such components shall be traceable to the original heat or lot numbers unless otherwise approved.

G. Certificates of compliance with applicable AWWA and ASME Standards.

H. Confirmation of suitability of the valve materials for the application.

I. Complete nameplate data of electric actuators.

J. Sizing calculations to include operator stress calculations of the valve, electric actuators, operating mechanisms with extension stems, gear actuators and anchor bolts.

K. Identify each submittal by the respective equipment identification and specification numbers.

L. A finite element analysis report shall be provided to demonstrate that the Bonneted Knife Gate will operate with flanges in an unconstrained condition. Calculations shall also be provided to show stresses and stress deflection on the stem, including connection to the disc as well as conformance to the allowable disc deflection under maximum operating pressure when mounted in the pipeline with appropriate bolt loads. A detailed summary of the required finite element analysis follows:

Finite Element Analysis

The purpose of the analysis is to provide documentation the design of the disc is sufficiently stiff and strong to ensure the gate leaf will not undergo deflection during loading sufficient that the performance or integrity of the gate would be compromised.

Three load conditions shall be examined, each with two variations resulting in six cases.

Case 1:

Load: The normal maximum water pressure in the seating direction with the gate fully closed and no other externally supplied load.

Constraints: Uniform, rigid support over entire surface of seat facing and no support along the bottom edge. **This shall be assumed to provide full translational restraint with zero rotational restraint.**

Case 2:

Load: The normal maximum water pressure in the seating direction with the gate fully closed and an externally supplied load acting vertically downward equal to the stall thrust of the electric actuator.

Constraints: Uniform, rigid support over entire surface of seat facing and no support along the bottom edge. **The seat facing shall be assumed to be frictionless, creating a condition of zero translational restraint in the direction parallel to the seat facing.** An obstruction below the disc shall be simulated by a high pressure area of load over an 8” width at the vertical centerline of the gate.

Case 3:

Load: The normal maximum water pressure in the seating direction with the gate fully closed and an externally supplied load acting vertically upward equal to the stall thrust of the electric actuator.

Constraints: Uniform, rigid support over entire surface of seat facing and no support along the bottom edge. **The seat facing shall be assumed to be frictionless, creating a condition of zero translational restraint in the direction parallel to the seat facing.** An obstruction above the disc shall

be simulated by two high pressure areas of load coinciding with the location of the top wedges.

Acceptance Criteria

The acceptance criterion is different depending on the load case.

Case 1 and Case 2 are considered normal conditions and have more restrictive criteria.

Deflection shall not exceed 1/500 the clear opening disc width at any point. Deflection along the seat facings surface (unseating head only) shall not exceed 0.010". Stresses shall not exceed 5,000 psi.

Case 3 is considered abnormal conditions and has less restrictive criteria.

Deflection shall not exceed 1/360 the clear opening disc width at any point accept within 12" of the load simulating the obstruction. Within this area the allowable defection is increased 50%. Deflection along the seat facings surface is not restricted. Stresses shall not exceed 10,000 psi.

Documentation

Documentation shall consist of two sets of color printed results showing stress and deflection and PDF files of the same. A one-half day conference shall be arranged to take place at the manufacturer's facility to discuss the methodology prior to the analysis and another one-half day conference to discuss the results. Transference of the software or model is not required and acknowledged to be proprietary.

Finite Element Analysis Details

The finite element analyses shall be developed with sufficient mesh density to accurately predict element stresses and deflection following a rational basis. Satisfactory performance of the finite element analyses and mesh density shall be verified and documented with simplified representative determinant models verified by hand calculations. These calculations shall be submitted with the results of all finite element analyses. A departure in peak magnitude of output parameters (stress and deflection) of 2% or less between simplified models and hand calculations shall be considered a satisfactory representation of modeling accuracy and finite element mesh density.

Finite Element Boundary Conditions

Boundary conditions of finite element models shall be developed following a rational basis to approximate actual conditions. Where actual conditions cannot be rationally established or validated, no less than two parallel models shall be developed representing rational extremes of potential boundary conditions. Results of parallel models shall be subject to the same acceptance and performance criteria outlined in this specification.

Finite Element Analysis Stress Contours

Finite element analysis results shall be prepared, submitted and presented graphically with stress contour renderings of output scaled to reflect minimum and maximum principal stresses. Peak stresses, their locations and magnitudes shall be labeled on each graph. Tabular output for selective modeled elements shall also be provided to summarize the minimum and maximum principal stresses acting at the surfaces of modeled elements.

Nature of Modeled Elements

Finite element analyses shall utilize solid modeling element techniques to effectively represent the special distribution of the bonneted knife gate valve assemblies unless the use of planar (shell) elements can be established following a rational basis. Narratives outlining the basis for selection of modeled elements may be submitted for review and comment at the beginning of the modeling process.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver, store, and handle the equipment and materials provided under this as specified in Sections 01 65 00– Product Delivery Requirements and 01 66 00 – Protection of Materials and Equipment.

B. Deliver all equipment/supplies in unopened/undamaged packages as required to safeguard the contents from rust, damage and any other deficiencies affecting the normal quality of the goods. Any packages showing evidence of damage shall be rejected.

C. All packages shall bear a packing list and be properly marked to show contract name, manufacturer's name, equipment/supply name and weight.

D. Any item within a package shall be properly labeled to match its name in the packing list.

E. All unpainted steel surfaces of exposed equipment shall be properly protected against rust prior to the installation.

F. All valves shall be bolted to skids in such a manner as to preclude damage in subsequent handling.

G. All exposed threaded and plain stem surfaces shall be securely wrapped in bubble-wrap or other appropriate protection. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Provide all special tools necessary to disassemble, service, repair and adjust valves and all spare parts recommended by the manufacturer.

B. Provide actuator spare parts according to manufacturer's recommendation including but not limited to a gasket, seal, packing gland, and packing for the 30" Bonneted Knife Gate Valve.

C. Provide instrumentation and control system spare parts in accordance with Section 40 61 13 PMCS General Requirements.

D. The spare parts shall be packed in containers suitable for long-term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

E. Spare parts list, included with the shop drawings submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

F. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. A separate number shall properly identify each part. Those parts, which are identical for more than one size, shall have the same part number.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship. The Contractor shall obtain from the manufacturer and provide to the City, a manufacturer's warranty, in an acceptable and beneficial form warranting valve and actuator assembly against defects in design, materials and workmanship for a period of four (4) years following expiration of Guaranty period set forth by Article 24.1 of the Construction Contract. The Contractor shall submit said warranty as a condition of final payment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hilton Valve

B. Lined Valve Company, Inc.

C. Or Approved Equal

2.02 MATERIALS / EQUIPMENT

A. Knife Gate Valve

1. The Contractor shall provide two (2) 30-inch bonneted knife gates inside the Intake and Control Structure structure as defined by the Bonneted Knife Gate Schedule at the end of this Section. All knife gate valves will be equipped with electric motor actuators.

2. Bonneted Knife gate valves shall be designed to operate with flanges in an unconstrained condition for 150 psi or twice the maximum static pressure (74 psi). Valves shall include a pressure-retaining bonnet that fully encloses the gate. The bonnet shall be rated at the same maximum static pressure (74 psi) as the valve body and shall not include any type of internal gate packing or gate wiper.

3. Face-to-face dimensions represent extended flanges to minimize body deflection and shall be as shown on the Contract Drawings. A wafer body is not acceptable.

4. The bottom end of the gate shall be square, and shall be guided and supported by the seat. The seat shall fully support the gate, top to bottom, throughout the entire travel length.

5. Flow shall be in the normal downstream direction and shall be indicated on the valve body by a prominent embossed directional arrow.

6. Materials in contact with water shall be NSF 61 approved.

7. Non-wetted parts of the valve body shall be fabricated ASTM A36 carbon steel. The body and bonnet shall be designed to meet ASME VIII Division 1 pressure vessel code. All parts in contact with the fluid (wetted parts) shall be Type 316 stainless steel, or 316L stainless steel in the case of welded members, including the packing gland and all internal fasteners.

8. Exterior connecting flanges shall be of the extended flange type or wafer body as shown on the drawings, shall be flat faced fully conforming to AWWA C207 Class D 150 psi with stiffeners as needed that do not conflict with the through bolt connections. All flanges shall be cast or fabricated carbon steel. The gasket surfaces shall be 316 stainless steel, fully machined with a spiral serrated finish. Unless otherwise recommended by the manufacturer and approved by the Engineer, gaskets shall be 1/8 inch thick full-faced gaskets manufactured from synthetic rubber and conforming to the appendices of AWWA C110, 111, and 115. Bolted Fittings shall conform to AWWA M11 standards.

9. The valve body shall have a square bottom design complete with minimum 1” diameter purge ports with threaded plugs in lower corners for flushing.

10. Body shall have suitable lifting eyes at locations to enable the entire valve and actuator assembly to be hoisted as one piece. Lifting eyes shall also be furnished to enable major components including valve body components, stem, stem guard, and the actuator—to be hoisted separately.

11. A means for removing stem, including all special tools or equipment necessary for removal within available headroom as shown on the Contract Drawings shall be provided. Body design shall incorporate bottom support pads with flat plate bottoms to fully support and anchor the valve to the floor.

12. The stainless steel body cladding and face rings shall be fully welded to the carbon steel body. The stainless steel body cladding shall be 316L, a minimum of 3/16” thick, and welded at a minimum spacing of 12 inches on center. Shop drawings depicting how the stainless steel cladding is welded to the carbon steel body shall be provided. “Floating” body liners are not acceptable.

13. The gate shall be finished machined on both sides to minimum 63 to 32 micro-inches rms or better made from ASTM A240 316 stainless steel. Gate shall be of ample thickness to ensure structural integrity and minimize gate deflection to no more than 0.002 inches per inch of nominal valve size measured at the center of the valve port at the maximum rated pressure presented in the valve schedule. Calculations shall be provided to ensure gate thickness meets this requirement.

14. Valve knife gate seating shall be 316 SS with an Ultra High Molecular Weight (UHMW) Polyethylene insert. Valve knife gate seating shall be circular, 360 degrees metal-to-metal. Fixed wedges shall be welded around the entire valve port to force the gate up against the seat in the fully closed position such that the specified leakage requirements are met

15. ASTM B 505 Aluminum Bronze acid-resisting stem nut shall be provided.

16. Both the 30” knife gate valves shall be equipped with a rising stem, outside screw and yoke (OS&Y) superstructure with a heavy-duty foot mounted yoke and 316 stainless steel stem. For the 30” valves, the stem shall be a 2 1/2-inch minimum diameter. The length /radius of the gyration ratio (l/r) shall not be less than 200 for each bonneted knife gate stem. Intermediate stem guides shall provide sufficient compressive and tension thrust resistance to buckling under the maximum stall thrust.

17. To prevent external leakage, the valve stem shall have an adjustable packing assembly consisting of a minimum of 10 rows of braided, 100 percent PTFE packing defined as food grade under the guidelines of the Food and Drug Administration all around the stem, evenly compressed within a stainless steel packing gland by a packing follower to act as the primary seal around the stem.. The packing gland shall be live loaded, maintaining a constant pressure on the packing utilizing springs or Belleville washers and shall be retained using NORD-LOCK wedge lock nuts. Allowable leakage of water through the packing to atmosphere shall be zero at any pressure up to and including two times the maximum static pressure (74 psi). The packing shall be replaceable without disassembling the valve or removing the valve from the pipeline.

18. A clear plastic vented stem cover, attached to the top of the motor operator, shall be provided with the electric actuator to act as a position indicator and to serve as a guard to protect against loose clothing catching in the screw. The cover shall be removable for inspection and maintenance. The position indicator on the stem cover shall read in percent open with 2 percent graduations.

19. Valves shall be designed so that all required lubrication can be completed externally with the valve installed in the pipeline.

20. All exterior carbon steel surfaces shall be sandblasted and coated with a minimum of 2 coats epoxy paint in accordance with Section 09 91 00.

21. Manufacturing facilities shall have ISO 9001/9002 certification, with welding certified to Section IX of ASME (2001 ASME Boiler and Pressure Vessel Code - Section IX: Welding and Brazing Qualifications).

22. Pipe flange to Valve flange connections shall be of the same class as the Valve flange.

23. The inside diameter of valve body and seat for all bonneted knife gates shall be equal to, or larger than the ID of the adjacent pipe.

B. ELECTRIC ACTUATOR

1. General Requirements

a. The actuators shall be for open-close service suitable for use on a nominal 480 Volt, 3 phase 60 Hz power supply and shall incorporate a high torque motor, worm gear reduction, absolute position encoder, electronic torque sensor, mechanically and electrically interlocked integral reversing starter with thermal overload protection, local control facilities, and terminals for remote control and indication connections. The actuator shall operate the valve from full open to full close or from full close to full open when subjected to the maximum operating pressure at the rate presented in the Bonneted Knife Gate Schedule. Actuators shall be as specified herein. Operating torques and loads shall be provided by the bonneted knife gate manufacturer and coordinated with the actuator manufacturer for actuator sizing. Valve manufacturer shall furnish the valve and actuator as a unit.

b. Front panel of enclosure shall be fitted with Local/Off/Remote, pad-lockable selector switch, Open/Close 110VAC indication lamps, and OPEN/CLOSE/STOP pushbuttons. Control logic for the indication lamps will be derived from control relays internal to the actuator.

c. It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without the necessity to remove any electrical compartment covers or additional tools. Additionally, diagnostic information shall be available from an actuator-mounted display window with a non-intrusive means of reading and writing data to the actuator. Non-intrusive half duplex communication shall be possible to facilitate the downloading of actuator set-up characteristics.

d. The actuator shall be capable of functioning in an ambient temperature ranging from minus --30°F (-34°C) to +120°F (+49°C).

e. Hydraulic or pneumatic actuators in lieu of electric motor/gear mechanical type actuators will not be acceptable.

f. Actuators shall be IQ as manufactured by Rotork Controls, Rochester, New York 14621, or MX as manufactured by Limitorque

Corporation, Lynchburg, VA, 24506, TEC or M2 CP as manufactured by EIM Missouri City, Texas, 33619 or approved equal.

g. The actuators shall be mounted to and supported by the knife gate valve bonnets. Mounting brackets shall meet MSS standards and mate directly to the bolt pattern of the actuator base.

2. Operating Requirements

a. The electric motor actuators shall be designed to fully open or close the valves at the rate specified in the bonneted knife gate valve schedule. The actuators shall be designed to operate the valve, with or without a secondary gearbox as required for specific valve application, at the maximum static pressure (74 psi) as well as the rated valve operating design head during maximum flow rate as specified in the bonneted knife gate valve schedule.

b. The actuator shall be sized to guarantee valve opening and closure at the valve rated differential pressure plus safety factor as specified in AWWA C542. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal.

3. Mechanical Requirements

a. Actuators shall be of the self-locking worm gear type, O-ring sealed and lubricated for underground service and watertight to IP68 7 meters-72 hours, NEMA 6P,. All external hardware shall be made of Type 316 or Type 630 stainless steel as approved.

b. Actuators shall have Type 316 stainless steel or S17400 stainless steel (ASTM A564 Type 630) input shafts and special seals to prevent corrosion. The actuator shall conform to the applicable requirements of AWWA Standard C542 and to the specific requirements stated herein.

c. Calculations shall be submitted to the Engineer to substantiate the selection of, and for approval of the proposed actuator. These calculations shall be readily checkable and detailed. A computer printout of just the critical torque values will not be acceptable.

d. Gearing - The actuator gearing shall be totally enclosed in an oil-filled gear case suitable for operation at any angle. Power transmission shall be completely bearing supported and consist of a hardened alloy steel worm and bronze alloy worm gear. All other gears and components associated with the primary output drive shall be manufactured from appropriate alloy steels. For rising stem valves, a bronze removable thrust bushing (stem nut) shall be provided to accept a rising stem. A thrust base attached to the

bottom of the actuator shall incorporate thrust bearings of the ball or roller type and the design should be such as to permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service. Food grade gear oil shall be used to lubricate the gear case.

e. Calculations shall be submitted for all shaft selections including tension and bending, and for stresses on the bushing projected area. A kinetic transmission diagram of the gear train and other mechanical devices for realizing motion to the ultimate parts shall also be included in the submittals. Gear ratios / velocities shall be stated in the diagram.

f. Hand wheel - A manual hand wheel with a 2 inch square drive nut and requiring no more than 60 lbs. rim pull to operate valve at the maximum operating pressure shall be provided for manual operation. Hand operation shall be engaged using a hand/auto selection lever with the drive being restored to power automatically by starting the motor. The local/remote hand/auto selection lever shall be pad lockable in both "local" and "remote" positions. It shall be possible to select hand operation while the actuator is running or start the actuator motor while the local/remote selection lever is locked in "local" without damage to the drive train.

g. The hand wheel drive must be mechanically independent of the motor drive, and any gearing shall be such as to permit emergency manual operation in a reasonable time.

h. The hand wheel shall have an arrow indicating the required rotation direction (counter clockwise) for opening the valve.

i. Drive Bushing - The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. Normally, the drive bush shall be positioned in a detachable base of the actuator. Thrust bearings, when housed in a separate thrust base, shall be of the sealed-for-life type, or alternative, as approved by the Engineer.

j. Torque and Turns Limitations - Torque and turns limitation shall be adjustable as follows:

    1) Position setting range: 2.5 to 10,000 turns, with resolution to 7.5° of actuator output.

    2) Torque setting: 40% to 100% of rated torque.

    3) "Latching" to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.

k. The electric circuit diagram of the actuator shall not vary with valve type, remaining identical regardless of whether the valve is to open or close on torque or position limit.

l. Local Position Indicator - The actuator shall include a digital position indicator with a display from fully open to fully closed. Red and green lights corresponding to open and closed positions shall be included on the actuator.

m. Torque Measurement - It shall be possible to monitor real time torque during valve travel as a percentage of actuator rated torque both locally at the actuator and remotely via torque output card to PMCS.

n. Valve Opening Direction - All valves shall open in the counterclockwise direction.

4. General Electric Requirements

a. Motors - Motors shall be Class F insulated with a time rating of 30 minutes or the time for three complete Open-Close-Open cycles, whichever is the greater, at an average load of at least 33% of maximum valve torque whilst not exceeding a motor stator temperature of 132°F (55°C).

b. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gear case. The motor shall be easily removed through the use of a plug-in connector and shaft coupling.

c. Motor shall be separately sealed from the terminal compartment and shall not require the use of a motor trickle heater to guarantee motor performance within the specified ambient temperature range.

d. Motors shall be 3-phase, 60 Hz, 480 volts. The motor shall have high starting torque and low starting current. Stall torque shall be a maximum of 225 percent of rated torque.

e. Motor Protection - Protection shall be provided for the motor as follows:

1) The motor shall be automatically de-energized in the event of stall when attempting to unseat a jammed valve.

2) Motor thermal protection to protect motor against overload

3) Single-phasing protection.

f. Internal Starter and Transformer - The reversing starter, control transformer, and local controls shall all be integral parts of the valve actuator, and be suitably housed to prevent breathing and condensation build up. A separate space heater shall not be necessary to avoid condensation of moisture.

g. For open/close service, the starter shall be an electro-mechanical type suitable for 60 starts per hour and of rating appropriate to motor size.

h. The controls supply transformer shall be fed from two of the incoming three phases and be provided with dual fuses. It shall have the necessary wiring taps and be adequately rated to provide power for the following functions:

1) One hundred and twenty (120) VAC or 24VAC to energize the contactor coils.

2) Supply for all of the internal electric circuits.

3) The primary and secondary windings shall be protected by dual fuses as per NEC code.

5. Control

a. Controls provided with the valve actuator shall be coordinated and comply with the requirements specified under Section 40 61 93 – PMCS Input Output Schedule and Section 40 61 96 – PMCs Control Strategies.

b. Integral to the actuator shall be local controls for Open, Close, and Stop, and a local/remote selector switch that is pad-lockable in 'any one of the following positions:

1) Local Control Only.

2) Off (No Electrical Operation).

3) Remote Control plus Local Stop Only.

c. In addition, software integral to the actuator shall make it possible to remove the local push button controls and provide the following non-intrusive functions:

1) Local Infrared setting tool control for Open/Stop/Close.

2) Off (No Electrical Operation).

3) Remote Control Only.

d. For actuator security, the software will only be accessible via a local non-intrusive means or a setting tool using infra-red control.

1) It shall be possible to select maintained or non-maintained local control.

2) Control Facilities - The necessary wiring and terminals shall be provided in the actuator for the following control functions:

3) Remote control shall be via conventional terminal strip and multiwire control to the PMCS. Refer to Instrumentation Drawings.

4) It shall be possible to reverse valve travel without the necessity of stopping the actuator. The starter contactors shall be protected from excessive current surges during travel reversal by an automatic time delay on "energize coil" command of approximately 300 ms.

5) The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1.1kV.

6) Upon loss of control signal from the PMCS, the actuator shall be programmed to fail in its last position.

e. Fuses on the secondary side of the internal transformer shall also be provided for lightning protection.

f. Batteries shall not be needed to maintain settings in the event of loss of main power.

g. Data Logging - Each actuator shall be fitted with an on-board Data Logging device that will capture and store all operational events. Valve torque profile including actual last stroke profile as well as historical average profile for both the opening and closing directions will also be recorded to allow analysis of valve performance under working process conditions. Data Logger information will be accessed via either an interface or via infrared communications to a non-intrusive communications tool or half-duplex communications.

h. Wiring and Terminals - Internal wiring shall be of tropical grade PVC insulated stranded cable of appropriate size for the control and three-phase power. Each wire shall be clearly identified at each end, either stamped or tagged. The terminals shall be embedded in a terminal block of high tracking resistance compound.

i. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal. The terminal compartment of the actuator shall be provided with a minimum of three threaded cable entries.

j. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable.

k. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating:

1) Serial Number

2) External Voltage Values

3) Wiring Diagram Number

4) Terminal Layout

a) This must be suitable for the Contractor to inscribe cable core identification beside terminal numbers.

l. Dry Contact Form C Status Indications shall be provided for Overload Trip (Over-temp), Over Torque Trip, General Fault or Failure, Full Open Position, Full Closed Position.

6. Enclosure

a. Actuators shall be O-ring sealed, watertight to IP68 7 meters-72 hours, NEMA 6P, and shall at the same time have an inner watertight and dustproof O- ring seal between the terminal compartment and the internal electrical elements of the actuator fully protecting the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling. Enclosure protection of NEMA 6P, IP68, shall be guaranteed without the need of suitable cable glands. Enclosure must allow for temporary site storage without the need for electrical supply connection. The use of external breathers shall not be allowed. Enclosure must allow for temporary site storage without the need for electrical supply connection. All external fasteners shall be of stainless steel.

7. Shop Paint

a. Paint Finish for Aluminum Housings: Baked on polyester powder coating nominal 75 microns thick and must have passed ASTM B117 35 degrees C Salt Spray Test for 1000 hours.

b. Paint Finish for Ferrous Housings: Tnemec Series 20 Pota-Pox, 2 Coat Epoxy.

c. The following individual components of each actuator shall be coated and cured prior to assembly.

1) Housings

2) Housing Covers

3) Limit and Torque Switch Covers

4) Handwheels, excluding handle

5) Any other External Mating Parts

6) Support Brackets

d. Coating of assembled valve actuators will not be permitted. The Contractor shall furnish a coating procedure for each component. The intent of this coating procedure is to provide for disassembly of

the equipment without the cracking and breaking away of paint that has bridged and sealed the mating parts.

e. There shall be strict adherence to manufacturer's directions for preparation and application of coatings. No coating shall be applied when the ambient temperature is below 60 degrees Fahrenheit. Coatings shall not be baked but shall be allowed to dry or cure at temperatures between 60 and 120 degrees Fahrenheit.

f. The coating film shall not contain any bare spots, blisters or cracks, and shall be uniformly deposited without runs or sags. The coating shall be worked into angles and crevices formed by joining members. After curing it shall not be easily chipped or peeled by penetration with a knife point and the Contractor shall touch up all spots damaged by such knife point tests.

g. The completed coatings shall be given an electrical flaw detection test including a mil thickness test in accordance with the recommendations of the manufacturer of the coatings as approved by and under the direction of the Engineer. Defective coatings shall be removed to bare metal to the extent necessary and recoated in accordance with this Section.

8. Startup Kit

a. Each actuator shall be supplied with a startup kit mounted on the inside of each disconnect door and comprising of installation instructions, electrical wiring diagram, and sufficient spare cover screws and seals to make good any site losses during the commissioning period.

9. Spare Parts

a. As a minimum, the following spare parts shall be provided:

1) Motor Module - Spare motor module which shall include motor and other attachments on it shall be supplied for every variant of actuator motor type.

2) Electronic Control Chassis - Spare electronic control chassis assembly complete with push button controls shall be supplied.

10. Training

a. The Contractor shall provide both office and field training for DEP personnel in the operation and maintenance of the actuator including all components and controls provided in the system in accordance with Section 01 79 05 – Equipment Start-up and Training and as further defined herein. Field training shall be coordinated between manufacturer of valve and actuator so that it occurs concurrently. The office training shall consist of both classroom and hands-on

sessions conducted on-site. The Contractor shall be responsible for scheduling and coordinating all training. An outline of the proposed operation and training program and the schedule for such training program shall be submitted for the review and approval of the Engineer at least two months in advance of the training event. The Contractor shall be prepared to provide training for as estimated 12 DEP employees. The training program topics shall include detailed information on the actuator design, construction, programming, operation, maintenance, trouble shooting, and partial disassembling and reassembling of the units as may be necessary during the useful life span of the actuator. The training attendees shall be given copies of written handouts, drawings, manuals, and pictures used in the training.

b. After installation of the equipment, the Contractor shall provide field training for DEP personnel in the operation and maintenance of the actuator, including all components and controls provided in the system. Operation and maintenance manuals shall be provided in accordance with Section – 01 78 25 Operation and Maintenance Manuals

c. The operational training shall include the instruction and training of DEP personnel in the operation, maintenance and use of all aspects of the actuator, the communicator, setting tool, etc. This training shall be performed by qualified representatives of the actuator manufacturer. An outline of the proposed operation and training program including a schedule for such training program shall be submitted for the review and approval of the Engineer at least two months in advance of the training event.

11. Witness Shop Testing of Motor Actuator Drive Units

a. Test reports shall be certified and shall include the motor and actuator serial number. Six copies shall be submitted to the Engineer.

b. Each motor shall be given a standard witness shop test by the motor manufacturer, which shall include recording and performing the following:

1) full load torque

2) full load rpm

3) full load current

4) full load watts

5) locked rotor current

6) locked rotor torque

7) locked rotor watts

8) no load RPM

9) no load current

10) no load watts

11) high potential test

12) winding resistance

c. One motor of each size shall receive additional items of testing including a rated load temperature test, motor internal thermostat operation test and performance curves of efficiency, power factor, speed and amperes versus torque from no load through locked rotor torque. One motor of each size of actuator shall receive a full test at +/- 10 percent of rated voltage. Tests shall be performed in accordance with NEMA standards and IEEE publication No. 112, "Test Procedure for Polyphase Induction Motors and Generators". Test reports shall be certified and shall include motor serial number. Six copies shall be submitted to the Engineer.

d. Each actuator with integral starter and pushbuttons shall be shop tested at the rated voltage, in the presence of the Engineer at the manufacturer's facilities. During this test the motor drive unit shall be operated in the closed and open directions. Data obtained shall include:

1) Full load and stalled output torque at the output shaft of the drive unit for each direction of rotation.

2) Torque switch settings to produce 150 percent of the rated output torque, or value approved by the Engineer, at the output shaft, in each direction of rotation, and corresponding voltage, current and power readings at the torque switch trip.

3) Voltage, current and power, and rpm at no load, full load and stalled output torque at the output shaft and, when the torque switch opens, in each direction of rotation.

4) Hand wheel rim effort required to develop the rated output torque.

5) Torque limiter slip input torque and output torque

6) Motor temperature rise for the duty rating of the unit, with temperature rise measured using the resistance method.

7) One actuator of each size shall be fully tested at +/- 10 percent of rated voltage.

e. The quarter-turn gear boxes of the actuators shall be given a stall test (stalled by the gear box internal stops) in both directions of travel. The gear box cover shall be opened after the performances of these stall conditions. If the internal components are not damaged,

the gear boxes shall be reassembled and the actuators with the gear boxes shall be operated in both directions again, in order to verify that the gear boxes are in proper working order.

f. Acceptable limits of measured torque at the output shaft, and of rpm, are as follows:

1) Full load running torque at rated voltage and full load running current shall be within plus ten and minus five percent of rated torque.

2) Stall torque at rated voltage shall be within plus zero and minus fifteen percent of the compute stall torque.

3) Speed shall be within plus or minus five percent of rated rpm.

g. A certified test report for the drive units shall be submitted for approval.

h. During actuator shop testing, the torque switch settings shall be checked to verify that they are set as specified.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. SHOP PAINTING

1. Exterior steel, cast-iron and ductile iron surfaces of all exposed valves and appurtenances except for stainless steel parts, machined surfaces and bearing surfaces shall be epoxy coated in the shop.

2. The surface preparation, priming, finish painting, and field touch-up painting shall conform to the Section 09 91 00 - Painting. Exterior surfaces, which are not accessible after assembling, shall be painted prior to assembling.

3. Wetted stainless steel surfaces shall not be painted but shall be prepared and covered with plastic sheet for protection during painting. Visible external stainless steel parts shall be painted.

4. All steel, cast-iron and ductile iron machined surfaces excepted from painting shall be coated with a corrosion inhibitor Glyptal 1201 red enamel.

5. Operator Coatings: All surfaces of cast iron, ductile iron and carbon steel shall be coated in accordance with Section 09 91 00 and as specified herein. All coating shall be performed by the manufacturer, prior to shipment to the site.

a. All machined surfaces of the iron and steel operator enclosures not in contact with water and machined surfaces such as those flanges for mounting shall be painted with one coat, 0.005- inch (5 mils) minimum, of Glyptal Series 1201 Red Enamel as manufactured by Glyptal Inc., Chelsea, MA 02150. or approved equal.

b. All machined surfaces are to be cleaned and brush coated with one thin (3mils) of Glyptal 1201 red enamel.

c. All exterior carbon steel surfaces of the knife gate valves shall be painted with 2 coats of Tnemec Series 140 Pota Pox Plus, thickness 4 to 6 mils DFT per coat, color 1255 Beige, in accordance with Section 09 91 00 for submerged service.

d. All bolt holes are to be painted with one smooth coat of Series 140 Pota-Pox II.

e. Painting, including thickness checks of all intermediate and final coats (per ASTM B499 or SSPC-PA-2, as applicable), Holiday Test (per ASTM D5162, Test Method A, Low Voltage Wet Sponge Test), and Adhesions Tests (per ASTM D3359, Acceptance Level 5A.)

f. Coating of assembled valve operators shall not be permitted. The manufacturer shall furnish a coat procedure for each component. The intent of this coating procedure is to provide for disassembly of the equipment without the cracking and breaking away of paint that has bridged and sealed the mating parts.

6. Testing of all finished paint systems shall include all quality assurance tests required per Section 09 91 00, Painting, including thickness checks of all intermediate and final coats (per ASTM B499 or SSPC-PA-2, as applicable), Holiday Test (per ASTM D5162, Test Method A, Low Voltage Wet Sponge Test), and Adhesions Tests (per ASTM D3359, Acceptance Level 5A.)Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Inspection may include but not be limited to quality of the castings and other major components, mechanical and chemical testing, material sampling, material certifications, traceability of parts, blasting and painting and hydrostatic testing of the valves.

B. Test valves hydrostatically at twice the maximum static pressure (74 psi) and then test them for leakage at the maximum static pressure (74 psi). The allowable leakage shall be as presented in the bonneted knife gate schedule.

C. Certified copies of all motor tests shall be furnished to the Engineer prior to the time of equipment field tests.

D. Perform shop tests in accordance with the specifications and the ANSI /AWWA standards listed in Article 5.1 including leakage tests. Copies of the certified test results shall be submitted in accordance with the Contract Documents

E. Valves shall be shop adjusted to ensure proper operation. The operator shall be installed on the valve prior to shop adjustment. All shop testing shall be witnessed by the City.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. The Contractor shall install and test the bonneted knife gate valves and related equipment in accordance with the approved Manufacturer's shop drawing and the requirements of the Contract Documents.

3.03 FIELD TESTING / QUALITY CONTROL

A. The Contractor shall provide field testing and quality control services in coordination with services to the performed by the Manufacturer.

B. The Contractor shall install the equipment, field test the equipment, make any necessary adjustments, field calibrate the equipment upon completion of the installation of each actuator and gate, and place it in initial operation. In addition, he shall instruct the operating personnel in operations, calibration, trouble-shooting and maintenance of the equipment.

C. A written report covering the representative's findings and installation approval shall be mailed directly to the Engineer covering all inspection and outlying in detail any deficiencies noted.

D. The Manufacturer's representative shall sign in and out at the office of the Engineer each day they are at the Site.

E. Reports: The Contractor shall assist the Manufacturer's field representative in completing a report to the Engineer of each visit to the site. Reports shall provide complete information on time, schedule, tasks performed, persons contacted, problems corrected, test results, training, instruction and all other pertinent information.

F. Tests

1. All gates shall be field tested in dry condition prior to full reservoir head conditions (12.3 psi). The gates shall be run through three (3) full operating cycles, using the motor-actuator. A full cycle shall be defined as: Open-to-Close and Close-to-Open. Each gate shall be operated 6 inches in each direction using the hand wheel.

2. Field test all gates furnished for leakage, strength, and opening and closing against the maximum heads indicated in the gate schedule as practicable based on available water levels.

3. Field test all gates and operators by having each motor-actuator open and close the bonneted knife gate through the full range of travel under full static head conditions, with the downstream control valves fully open for one complete cycle-Open to Close-to Open. Operate each gate 3 inches in each direction, using the hand wheel. The field tests shall demonstrate that all

equipment, controls and monitoring operate as specified and within the allowable leakage rates for each test run.

4. Comply with additional testing requirements as specified in Section 01 75 10, Preliminary and Final Field Tests and elsewhere in the Contract Documents.

Bonneted Knife Gate Valve Schedule

Design Criteria	**30" Bonneted Knife Gate Valve**
Non-Wetted Material	Carbon Steel
Wetted Material (unless specifically stated otherwise)	316 SS or 316L if welded
Flange Ends	AWWA C 207 Class D 150 psi
Disc	Stainless Steel, A240, Type 316
Stems	Stainless Steel, A276, Type 316
Pedestal	Cast Iron, ASTM A126, Class B or ASTM A48 Class 30; or Carbon Steel Pipe, ASTM A53 or A120 with Steel Flanges, or Carbon Steel, ASTM A36
Stem Couplings	Stainless Steel Type 316, ASTM B 584
Stem Guides	Cast Iron, ASTM A126, Class C or ASTM A48, Class 40; or Carbon Steel, ASTM A36; with Aluminum Bronze Liners, ASTM B505
Anchor Bolts and Nuts	Stainless Steel, ASTM F593 and A594, Type 316
Bonneted Knife Gate AWWA Standard	C 520
Quantity	1
Maximum Static Pressure (PMF Reservoir Elevation), psi	
Rated Design Pressure, psi	150
Rated Operating Pressure Range @ Maximum Flow, psi	
Maximum Operating Flow-Both Gates Valves Operating, cfs	100
Seal Type	Metal 316 SS with Stellite Hardfacing
Motor Capacity, hp	5
Electrical, volts/hertz/phase	480/60/3
Allowable Leakage cc /min/in (valve diameter)	40
Maximum Operating Speed, in/min	1

G. Painting

1. The Contractor shall perform field painting in accordance with the requirements of Section 09 91 00 – Painting and as specified herein.

3.04 STARTUP / DEMONSTRATION

A. Services of the Manufacturer's Representative:

1. The Contractor shall provide the services of a qualified manufacturer's representative in accordance with the requirements of the Contract Documents and Section – 01 79 05 Equipment Start-Up and Training for a minimum period of not less than two (2) days including training. The Contractor shall also coordinate with the Bonneted Knife Gate Manufacturer and the Electric Actuator Manufacturer so that equipment start-up and training in the field is accomplished concurrently. Should additional services be required for a successful installation, such services shall be furnished at no additional costs to the City.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Lubricants

1. The Contractor shall provide lubricants, in accordance with Section 01 78 10 - Project Closeout. Lubricants and temporary anti-corrosion compounds for water valves shall be NSF 61 approved.

Design Criteria	**30” Bonneted Knife Gate Valve**
Non-Wetted Material	Carbon Steel
Wetted Material (unless specifically stated otherwise)	316 SS or 316L if welded
Flange Ends	AWWA C 207 Class D 150 psi
Disc	Stainless Steel, A240, Type 316
Stems	Stainless Steel, A276, Type 316
Pedestal	Cast Iron, ASTM A126, Class B or ASTM A48 Class 30; or Carbon Steel Pipe, ASTM A53 or A120 with Steel Flanges, or Carbon Steel, ASTM A36
Stem Couplings	Stainless Steel Type 316, ASTM B 584
Stem Guides	Cast Iron, ASTM A126, Class C or ASTM A48, Class 40; or Carbon Steel, ASTM A36; with Aluminum Bronze Liners, ASTM B505
Anchor Bolts and Nuts	Stainless Steel, ASTM F593 and A594, Type 316
Bonneted Knife Gate AWWA Standard	C 520
Quantity	1
Maximum Static Pressure (PMF Reservoir Elevation), psi	
Rated Design Pressure, psi	150
Rated Operating Pressure Range @ Maximum Flow, psi	
Maximum Operating Flow-Both Gates Valves Operating, cfs	100
Seal Type	Metal 316 SS with Stellite Hardfacing
Motor Capacity, hp	5
Electrical, volts/hertz/phase	480/60/3
Allowable Leakage cc /min/in (valve diameter)	40
Maximum Operating Speed, in/min	1

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 97– IDENTIFICATION FOR PROCESS EQUIPMENT
CONTRACT CAT 475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish and install all components of the system for identification of exposed piping and equipment.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	9
PART 3	EXECUTION	9
3.01	Examination / Preparation	9
3.02	Installation	9
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

C. The following schedules, attached after the “End of Section” designation, are a part of this Section:

1. Schedule 40 05 97-1, Dimensions of Identification Signs and Nameplates.
2. Schedule 40 05 97-2, Table of Standard Colors.
3. Schedule 40 05 97-3, General Color Code.
4. Schedule 40 05 97-4, Pipe Identification Signs.
5. Schedule 40 05 97-5, Nameplates.
6. Schedule 40 05 97-6, Pipeline and Equipment Identification.

7. Schedule 40 05 97-7, Mixed Sludge and Digested Sludge Recirculation Pipeline and Equipment Identification.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting

1.04 REFERENCES

A. ASTM D523 Standard Test Method for Specular Gloss

B. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

C. ASTM D638 Standard Test Method for Tensile Properties of Plastics

D. ASTM D646 Standard Test Method for Grammage of Paper and Paperboard (Mass per Unit Area)

E. ASTM D709 Standard Specification for Laminated Thermosetting Materials

F. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

G. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

H. ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

I. SAE AMSSTD595 Colors Used in Government Procurement.

J. New York City Local Law 30

1.05 DESCRIPTION

A. This Section describes the system for the identification of piping and equipment. This includes the placing of identification signs and direction-of-flow arrows on all visible, exposed plant piping, the placing of nameplates on plant equipment and structures, and painting in color of all equipment and pipe (except stainless steel or aluminum surfaces) as shown on the Contractor's Shop Drawings submitted under other Section(s) for equipment, piping, and valves, and as required.

1.06 QUALITY ASSURANCE

A. Provide the specified items from firms regularly engaged in the manufacture of identification devices of types and sizes required, with at least five (5) years' experience in manufacturing signs.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Submit samples of the lettering to be used for fiberglass reinforced plastic signs to the Engineer for approval before manufacturing begins.

1) Such samples must show the height, width and spacing of letters and numbers for any three (3) legends of ten or more letters and spaces as specified herein.

b. Submit sample direction-of-flow arrows for both sizes of pipe identification signs to the Engineer for approval before installation.

c. Submit details of the method of fastening nameplates to the Engineer.

1) Since it is impractical to detail each means of attachment in the Contract Drawings, each means of attachment shall receive approval only on its own merits – submit for approval sketches of each type of attachment proposed.

2. Information Submittals:

a. Submit certification on acid resistance to the Engineer prior to installation.

b. Submit manufacturer's guarantee and warranty, in writing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the materials provided under this Section, and as per the requirements of the Contract Documents.

B. In addition, provide the following spare parts for identification of piping and equipment:

1. For every twenty (20) pipe identification signs installed:

a. One (1) pair stainless steel mounting screws

b. One (1) pair stainless steel threaded brackets

c. One (1) pair fiber or plastic washers

d. One (1) pair stainless steel banding seals

2. One (1) set banding tools and banding accessories

3. One (1) stainless steel banding strap, approximately 1000 ft.

4. One (1) complete nameplate mounting assembly for every twenty (20) nameplates installed

5. One (1) stainless steel cable and splice for every twenty (20) valve identification tags

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mounting assembly "Steelbinder" strapping units:

1. A.J. Gerrard & Co., Lake City, FL;

2. Independent Metal Strap, Roslyn, NY;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Construction:

1. Construct fiberglass reinforced plastic identification signs and nameplates of 100 mils thick fiberglass reinforced plastic conforming to ASTM D709.

2. Provide fiberglass reinforced plastic process with a blemish free, low gloss surface of superior permanence and durability in the colors selected.

3. Construct all signs and nameplates in conformity with ASTM D523, D638, D646, D790, D792, and D5420.

4. Make direction-of-flow arrows for attachment to pipe identification signs from No. 16 U.S. gauge Type 304 stainless steel, the full width of the sign.

5. Chemical Resistance:

a. Provide fiberglass reinforced plastic signs resistant to abrasion, impact, corrosion, and the following acids, alkalis, salts, and solvents in accordance with ASTM D543:

1) 10% citric acid

2) 5% acetic acid
3) 3-30% sulfuric acid
4) 10% ammonium hydroxide
5) 10% sodium chloride
6) turpentine
7) mineral spirits
8) heptane
9) kerosene
10) ethyl alcohol
11) ethyl acetate
12) transformer oil
13) heavy duty detergents
14) water

B. Lettering:

1. Provide lettering made by silk screening or other permanent embedment of subsurface printed graphics in the material so as to produce a clear, legible sign.

C. Grommets and Holes:

1. Provide signs for piping and valve identification with two ⅜-in. diameter grommet-protected holes located on the long side center line, the center of the hole to be ½-in. from the edge.
2. Provide nameplates for equipment and structures with four ⅜-in. diameter grommet-protected holes, the center of the hole located ½-in. away from the edges.
3. Provide all holes with suitable brass or stainless steel grommets.
4. Shall be of Type 304 stainless steel construction.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Dimensions of Signs and Tags:

1. Provide identification signs and nameplates rectangular in shape and of the dimensions specified in Schedule 40 05 97-1, Dimensions of Identification Signs and Nameplates, located after the "End of Section" designation.
   a. A dimensioned tolerance of $\pm 1/16$- in. is permissible.

B. Lettering of Signs:

1. Perform all lettering and numbering on identification signs and nameplates in block style in size and spacing to suit the size of sign, as approved by the Engineer.
2. Unless otherwise approved by the Engineer, the following limits shall apply:
    a. Limit the legend on pipe identification signs to one (1) line and to a total of 12 letters and spaces
    b. Limit the legend on equipment nameplates to two (2) lines and a maximum of 35 letters and spaces.
3. Do not place lettering, symbols or markings containing the name of the manufacturer on the signs.
    a. The contract number and the year of the contract as given on the Contract Drawings may be placed in small lettering on the front of the sign, if approved by the Engineer.

C. Colors:

1. Provide each identification sign and nameplate in two colors and with the legend specified.
    a. Provide the backside of the sign in black or some other uniform color.
2. Code pipeline signs and equipment nameplates and finish coats of paint for pipe lines and equipment in basic colors.
3. Provide brilliant colors, distinctive shades matching as closely as possible (without custom color blending) the basic colors as specified by the Munsell Color System (MN) in Schedule 40 05 97-2, Table of Standard Colors, located after the "End of Section" designation:
4. Provide identification signs for pipelines of all sizes, mechanical equipment, sluice gates, and valves in the color combinations specified in Schedule 40 05 97-3, General Color Code, located after the "End of Section" designation.
5. Provide vents and drains of the same color combination as the contents of tanks and equipment vented and drained.
6. Identification signs for services not included in the Schedule 40 05 97-3 shall be black letters on a white background.

D. Legend for Pipe Identification Signs:

1. Provide identification signs, to identify the pipe line service, with the words or abbreviations in color combinations shown in Schedule 40 05 97-4, Pipe Identification Signs, located after the "End of Section" designation.

2. Number sluice gates and valves in conformity with the Basic Code as specified by the Operation and Maintenance Manual for the plant. Perform color combinations for such lines and valves in the same color combinations as the medium serviced and as specified in Schedule 40 05 97-3.

3. In addition to the identification requirements listed above, for all gas piping at pressures above ½ psig, show the maximum pressure level within the piping as required by New York City Local Law 30.

E. Valve Identification Tags:

1. Furnish and attach valve identification tags to all valves, gates, and controls.

2. Provide round fiberglass reinforced plastic tags, in sizes per Schedule 40 05 97-1, made in conformity with the requirements specified herein. Provide tags with one ⅛-in. grommet protected hole at the top for fastening to the valve body using $^{1}/_{16}$-in. diameter cable and splices or pins as approved. Provide grommets, cable splices and pins of stainless steel or other approved corrosion resistant material.

3. Provide numbering code for the identification tags in conformity with the Basic Code as specified by the Operation and Maintenance Manual for the plant. Assign identification numbers subject to the approval of the Engineer and in conformity with the entire piping and equipment identification system. Provide identification code for each valve and control without duplication. Provide lettering on identification tags not less than $^{5}/_{16}$-in. high and limited to two lines. Silk-screen lettering in correct color combination; stenciled or painted numbers and lettering will not be accepted.

4. In addition to the tagging requirements listed above, provide tags at all gas valves at pressures above ½ psig with the operating pressure within the valve shown as required by New York City Local Law 30.

F. Arrows:

1. Make the arrow head with a tapered point, about 90° at the apex, extending one half of the sign width from the sign edge and one half of the sign width extending under the sign.

   a. Make point with a radius of ¼-in. for the 3½-in. wide sign and a radius of $^{3}/_{16}$-in. for the 1½ in. wide sign.

2. Finish all edges of the arrow.

3. Punch detents on the arrows to prevent twisting of the point.

4. Drill one hole in the arrow in alignment with the hole in the pipe identification sign so that both sign and arrow can be mounted with the same screw and bracket.

G. Nameplates:

1. Provide nameplates for equipment and structures in the same color combination as the medium they service. Legends for nameplates must follow the terminology shown. Provide numbering system as described in the Operation and Maintenance Manual.
2. Schedule 40 05 97-5, Nameplates, located after the "End of Section" designation, is a representative list (and not necessarily complete) of nameplate legends with appropriate color combinations to which the equipment identification number(s) shall be added.

H. Additional Signs and Nameplates:

1. In addition to the legends specified above, the Engineer may order the Contractor to furnish and install additional identification signs, arrows and nameplates at no additional cost to the City.
2. Such additional signs may be requested near completion of the work and will be limited to no more than five (5) signs for each of the five (5) types listed in Schedule 40 05 97-1.
3. Conform legends and color combinations for additional signs to the requirements specified.

I. Color of Pipelines and Equipment:

1. Paint all pipelines and equipment in conformity with the requirements of Section 09 91 00 - Painting.
    a. Color code the color of the final coats of paint.
2. Match the color of the final coats as closely as possible, without custom blending, to the colors presented in Schedule 40 05 97-6, Pipeline and Equipment Identification, located after the "End of Section" designation.
    a. For mixed sludge and digester sludge recirculation pipelines and equipment, use Schedule 40 05 97-7, Mixed Sludge and Digested Sludge Recirculation Pipeline and Equipment Identification, located after the "End of Section" designation.
    b. The colors in Schedule 40 05 97-6 and Schedule 40 05 97-7 are identified by a name and their SAE AMSSTD595 color identification number and shall match this standard; the names of the colors in Schedules 40 05 99-6 and 40 05 97-7 are for convenience only.
3. Do not paint aluminum or stainless steel ductwork or jackets on insulated pipelines. Should the Contract Documents state that flanges, flexible couplings, valves, and/or fittings for such jacketed lines not be covered, paint only the flanges, flexible couplings, valves, and/or fittings in accordance with the piping color code.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Location:

1. Locate identification signs for piping along straight line runs at intervals of not more than 30 ft, near valves, branches and junction points and where pipes pass through walls or ceilings.
2. Place direction-of-flow arrows as shown or required.
3. Locate signs on large valves on or adjacent to the valve itself.
4. Place all piping identification signs so as to be easily visible from operating locations.
5. Locate nameplates on equipment bases and on structures at readily visible levels in such positions relative to the equipment and structures so as to prevent damage to the nameplate.

3.02 INSTALLATION

A. Mounting:

1. Mount identification signs and arrows on piping parallel and tangent to the pipe and valves by fastening with screws, plastic or fiber washers, threaded brackets, and banding straps and seals.
2. Provide screws and brackets of stainless steel with 5/16 - 18 American Standard Coarse Threads; provide No. 25 U.S. gauge stainless steel, /4 inch wide bands.
3. Where pipe is insulated, use care in mounting the signs so to prevent the banding straps from crushing the insulation.
4. Provide mounting assembly "Steelbinder" strapping units.
5. Mount nameplates in the manner specifically approved by the Engineer, after the installation of equipment or the construction of structures is complete.
6. Mount valve identification signs with approved stainless steel brackets or approved stainless steel strapping in such a fashion that sharp corners or edges on signs, brackets, bolts, chain or strapping will not constitute a hazard to personnel operating the valves.
7. Do not attach identification tags or signs to handwheels.

8. Use of flange bolts or bonnet bolts as a means of attachment of brackets shall receive consideration by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 40 05 97-1
DIMENSIONS OF IDENTIFICATION SIGNS AND NAMEPLATES

Type of Sign:	**Sign Dimensions: (Width × Length)**
PIPE IDENTIFICATION -	
1. Outside diameter of pipe (including pipe insulation):	
a. 4-in. and larger:	3½-in. × 12-in.
b. Less than 4-in.:	1½-in. × 7-in.
VALVE IDENTIFICATION -	
1. Valve tags:	2-in. diameter
2. Operating stands for valves and sluice gates:	1½-in. × 7-in.
NAMEPLATES -	
1. Equipment and structures	3½-in. x 12 in.

SCHEDULE 40 05 97-2
TABLE OF STANDARD COLORS

Color:	**Munsell Number:**
White	MN - N8.8/
Yellow	MN - 4Y7.5/12.8
Orange	MN - 0.5 YR 4.6/12.2
Red	MN - 7R 3.6/12.7
Brown	MN - 2.5 YR 4.2/4.3
Gray	MN - 2.5PB 5.8/1.7
*Charcoal	MN - 6B 5/0.4
Black	MN - N1/
Blue	MN - 3PB 3.3/7.4
Green	MN - 8G 4.4/6.2
* Provide color "Charcoal" for paints equivalent to MN - N 3.75.	

SCHEDULE 40 05 97-3
GENERAL COLOR CODE

Service Line:	Colors:	
	Letters:	Background:
1. FIRE AND STANDPIPE	White	Red
2. SLUDGE OR UTILITY GAS		
a. High Pressure	Black	Orange
b. Low Pressure	White	Orange
3. FUEL OIL	Orange	White
4. LUBRICATING OIL	Black	White
5. HYDRAULIC FLUID	Red	White
6. CHEMICALS		
a. Ferric Chloride	White	Blue
b. Glycerol	Brown	Yellow
c. Methanol	Black	Yellow
d. Polymer	Brown	Yellow
e. Sodium Bisulfite	Orange	Black
f. Sodium Hydroxide	Black	Yellow
g. Sodium Hypochlorite	Blue	Yellow
h. Other (Hazardous)	Black	Yellow
i. Other (Relatively Safe)	Brown	Yellow
7. OZONE	Black	Yellow
8. CHLORINE		
a. Gas	Black	Yellow
b. Liquefied	Red	Yellow
c. Solution	Blue	Yellow
9. LIQUIDS THICK IN SOLIDS	White	Black
a. Primary Sludge		

Service Line:	Colors:	
	Letters:	Background:
b. Digested Sludge c. Thickened Sludge		
10. LIQUIDS THINNER IN SOLIDS a. Secondary Sludge b. Return Sludge c. Mixed Liquor d. Grease, Scum, Grit	White	Brown
11. LIQUIDS WEAK IN SOLIDS a. Sewage b. Effluent c. Thickening Tank Drains, Vents, Overflow d. Digester Tank Drains, Vents, Overflow e. Concentration Tank Drains, Vents, Overflow f. Storage Tank Overflow, Drains g. Settling Tank Overflow, Drains h. Sump Drains	Black	Gray
12. STRAINED EFFLUENT a. Spray Water b. Flushing Water c. Plant Water	Yellow	Gray
13. NON-POTABLE WATER a. Seal Water b. Chilled Water c. Engine Cooling Water d. Sludge Heating Water e. Hydraulic Control Water	Yellow	Blue

Service Line:	Colors:	
	Letters:	Background:
14. CITY WATER	White	Blue
15. STEAM, DANGEROUSLY HOT WATER	Blue	Orange
16. ENGINE AIR		
a. Starting	Orange	Green
b. Intake	Yellow	Green
17. ENGINE EXHAUST	Yellow	Orange
18. VACUUM SERVICE	Black	Green
19. PLANT SERVICE (COMPRESSED) AIR	White	Green
20. PROCESS (BLOWER) AIR	Gray	Green
21. HIGH PRESSURE AIR	Orange	Green
22. HEATING, VENTILATING AND CONDITIONING AIR (Equipment And Ductwork)	Green	Charcoal

SCHEDULE 40 05 97-4
PIPE IDENTIFICATION SIGNS

Legend:	**Service:**	**Color Code:**	
		Lettering:	**Background:**
BLOWER LUBE	Blower lube oil	Black	White
BLOWOFF	Blowoff	*	*
CAUSTIC	Caustic soda (Sodium hydroxide)	Black	Yellow
CHILL SUPPLY	Chilled water supply	Yellow	Blue
CHILL RETURN	Chilled water return	Yellow	Blue
CHLORINE GAS	Chlorine gas	Black	Yellow
CHLOR. LIQ.	Liquefied chlorine	Red	Yellow
CHLOR. SOL.	Chlorine solution	Blue	Yellow
COMP. AIR	Compressed or plant service air	White	Green
CONDENSATE	Condensate	Yellow	Blue
DEFOAMANT	Defoamant or foam control	Brown	Yellow
DIESEL FUEL	Diesel fuel oil	Orange	White
DIGEST. SL.	Digested sludge	White	Black
DIG. O'FLOW	Digester overflow	Black	Gray
DISINFECT	Disinfectant	Brown	Yellow
DRAIN - *	Drain - *	*	*
EFFLUENT	Effluent water	Black	Gray
ENGINE AIR	Engine air intake	Yellow	Green
ENG. EXHAUST	Engine exhaust	Yellow	Orange
ENGINE LUBE	Engine lube oil	Black	White

Legend:	Service:	Color Code:	
		Lettering:	Background:
ENGINE VENT	Engine crankcase vent	Black	White
EXCESS SLUDGE	Excess sludge	White	Black
EXH. BLOWOFF	Exhaust silencer blowoff	Red	Blue
FERRIC	Ferric chloride	White	Blue
FIRE	Fire line	White	Red
FLUSH. WATER	Pump flushing water	Yellow	Gray
FLY ASH	Wet fly ash	White	Black
FUEL OIL	Fuel oil	Orange	White
FUEL FILL	Fuel oil fill	Orange	White
GAS – SLUDGE	Sludge gas	White	Orange
GAS – UTILITY	Utility gas	White	Orange
GAS – HP	Sludge or utility gas – high pressure	Black	Orange
GLY	Glycerol	Brown	Yellow
GREASE	Grease	White	Brown
GRIT	Grit	White	Brown
HI PRESS. AIR	High pressure air	Orange	Green
H.W. RETURN	Hot water return	Blue	Orange
H.W. SUPPLY	Hot water supply	Blue	Orange
HYDRAULIC	Hydraulic fluid	Red	White
HYPOCHLORITE	Sodium hypochlorite	Blue	Yellow
INSTR. AIR	Instrument air	White	Green
JACKET WATER	Engine jacket water	Yellow	Blue

Legend:	Service:	Color Code:	
		Lettering:	Background:
LUBE	Lubricating oil	Black	White
LUBE FILL	Lubricating oil fill	Black	White
METER - *	Metering - *	*	*
METHANOL	Methanol	Black	Yellow
MIXED LIQUOR	Mixed liquor	White	Brown
MIXED SLUDGE	Mixed sludge	White	Brown
MODIFIED SL.	Modified sludge	White	Brown
O'FLOW - *	Overflow - *	*	*
OZONE	Ozone	Black	Yellow
PLANT DRAIN	Plant drain	Black	Gray
PLANT WATER	Plant water	Yellow	Gray
POLYMER	Polymer	Brown	Yellow
PRIMARY SL.	Primary sludge	White	Black
PROCESS AIR	Process or blower air	Gray	Green
RECIRC. SL.	Recirculated sludge	White	Brown
RETURN SL.	Return sludge	White	Brown
SBS	Sodium bisulfite	Orange	Black
SCUM	Scum	White	Brown
SEAL WATER	Seal water	Yellow	Blue
SECOND. SL.	Secondary sludge	White	Brown
SEWAGE	Sewage	Black	Gray
SEW. SAMPLE	Sewage sampling	Black	Gray
SPRAY WATER	Spray water	Yellow	Gray

Legend:	Service:	Color Code:	
		Lettering:	Background:
STARTING AIR	Starting air	Orange	Green
STEAM	Steam	Blue	Orange
SUMP - *	Sump pump line - *	*	*
SUPERNATANT	Supernatant	Black	Gray
THICK. DR.	Thickener drain	Black	Gray
THICK. EFF.	Thickener effluent	Black	Gray
THICK. SL.	Thickened sludge	White	Black
TREAT. WATER	Chemically treated boiler feed water	Brown	Yellow
VACUUM	Vacuum line	Black	Green
VENT - *	Vent - *	*	*
WASTE GAS	Waste gas	White	Orange
WASTE OIL	Waste lubricating oil	Black	White
WATER	City water	White	Blue
* Where shown, specified or required, the legend for blowoff, drain, metering, sump, vent and similar lines shall also include the equipment, structure or identification number to which the service applies.			

SCHEDULE 40 05 97-5
NAMEPLATES

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
AIR BLOWER	**	White	Charcoal
AIR COMPRESSOR	**	White	Green
AIR HANDLING	UNIT **	White	Charcoal
AIR CONDITIONING	UNIT **	White	Charcoal
AUXILIARY ELECTRIC	GENERATOR **	Red	Green
AUXILIARY LUBE	OIL PUMP **	Black	White
BAR SCREEN	**	Black	Gray
BLOWER CONTROL	CABINET **	Gray	Green
BLOWER CONTROL AIR	RECEIVER **	White	Green
BLOWER LUBE OIL	AUX. PUMP **	Black	White
BLOWER LUBE OIL	COOLER **	Black	White
BLOWER LUBE OIL	RESERVOIR **	Black	White
BLOWER SILENCER	**	Gray	Green
BULK LUBE OIL	STORAGE **	Black	White
BYPASS OIL FILTER	**	Black	White
CHILLERS	**	White	Blue
CLEAN LUBE OIL	TANK **	Black	White
CONCENTRATION TANK	**	White	Black
CONDENSATE PUMP	**	Yellow	Blue
CONDENSATE RECEIVER	**	Yellow	Blue
CONDENSER	WATER COOLED **	Yellow*	Blue*
CONDENSER	AIR COOLED **	Yellow*	Blue*
CONE VALVE AIR	RECEIVER **	White	Green
DESCALER	**	Yellow	Blue

Legend:		Color Code:	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
DIESEL TANK	**	Orange	White
DIGESTION TANK	**	White	Black
DIRTY LUBE OIL	TANK **	Black	White
EFFLUENT-LUBE OIL	COOLER **	Yellow	Gray
EFFLUENT WATER	STRAINER **	Yellow	Gray
EFFLUENT WATER	PUMP **	Black	Gray
EFFLUENT WATER	TANK **	Yellow	Gray
ENGINE GENERATOR	**	Red	Green
ENGINE J.W.	MAKEUP	Yellow	Blue
ENGINE LUBE OIL	PURIFIER **	Black	White
ENGINE LUBE OIL	TANK **	Black	White
ENGINE OIL SUMP	TANK **	Black	White
EXHAUST FAN	**	White	Charcoal
EXCESS SLUDGE	DISTRIB. BOX **	White	Black
EXHAUST STEAM	CONVERTER **	Blue	Orange
FAN COIL UNITS	**	Blue*	Orange*
FLUSHING WATER	PUMP **	Yellow	Gray
FUEL OIL	PUMP **	Orange	White
FUEL OIL TANK	NO. 2 OIL **	Orange	White
FUEL OIL TANK	NO. 4 OIL **	Orange	White
FUEL OIL TANK	NO. 6 OIL **	Orange	White
FULL FLOW OIL	FILTER **	Black	White
GAS BOOSTER	**	Black	Orange
GASOLINE TANK	**	Orange	White
GAS COMPRESSOR	**	Black	Orange
GAS RECEIVER	**	Black	Orange
GAS SURGE TANK	**	White	Orange
HEAT EXCHANGER	OIL **	White	Orange

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
HEAT EXCHANGER	STEAM-WATER **	Blue	Orange
HEAT EXCHANGER	WATER-WATER **	Blue	Orange
HEAT RECOVERY	SILENCER **	Yellow	Orange
HEAT. & VENT.	UNIT **	White	Charcoal
HIGH PRESSURE AIR	COMPRESSOR **	Orange	Green
HIGH PRESSURE AIR	DRYER **	Orange	Green
HIGH PRESSURE AIR	RECEIVER	Orange	Green
HOT WATER BOILER	**	Blue	Orange
HOT WATER CONVERTER	DOMESTIC **	Blue	Orange
HOT WATER HEATER	ELECTRIC **	Blue	Orange
HOT WATER GENERATOR	DOMESTIC **	Blue	Orange
HYDRO-PNEUMATIC	TANK **	White	Blue
INLET SLUICE GATE	CYLINDER **	Red	White
JACKET WATER CIRC.	PUMP **	Yellow	Blue
JACKET WATER	COOLER **	Yellow	Blue
JACKET WATER ENG.	OIL COOLER **	Yellow	Blue
LUBE OIL	PURIFIER **	Black	White
LUBE OIL STORAGE	PUMP **	Black	White
LUBE OIL STORAGE	TANK **	Black	White
LUBE OIL TRANSFER	PUMP **	Black	White
MIXED SLUDGE	PUMP **	White	Brown
OUTLET SLUICE GATE	CYLINDER **	Red	White
OZONATOR	**	Black	Yellow
PLANT AIR	AFTERCOOLER **	White	Green
PLANT AIR	COMPRESSOR **	White	Green
PLANT AIR	RECEIVER **	White	Green

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
PLANT WATER	MAKEUP **	Yellow	Gray
PLANT WATER	TANK **	Yellow	Gray
PLANT WATER	PUMP **	Yellow	Gray
PUMP – CHILLED WATER	**	White	Blue
PUMP – CONDENSER WATER	**	Yellow	Blue
PUMP – DOMESTIC	HOT WATER **	White	Blue
PUMP – FEED WATER	**	Yellow	Blue
PUMP – FIRE	**	White	Red
RETURN FAN	**	White	Charcoal
RETURN SLUDGE	PUMP **	White	Brown
SCUM PIT	**	White	Brown
SEAL WATER	PUMP **	Yellow	Blue
SEWAGE EJECTOR	**	Black	Gray
SEWAGE FLOW	METER **	Black	Gray
SEWAGE PUMP	**	Black	Gray
SLUICE GATE CONT.	AIR CHAMBER **	White	Green
SLUICE GATE CONT.	AIR TANK **	White	Green
SLUICE GATE HYD.	FLUID PUMP **	Red	White
SLUDGE HEATER	**	White	Black
SLUDGE HEATING H.W.	CIRC. PUMP **	White	Orange
SLUDGE HEAT WATER	MAKEUP TANK **	Yellow	Blue
SLUDGE DOCK	PUMP **	White	Black
SLUDGE RECIRC.	PUMP **	White	Brown
SLUDGE STORAGE	TANK **	White	Black
SLUDGE TRANSFER	BOX **	White	Black
SLUDGE TRANSFER	PUMP **	White	Black
SPRAY WATER	PUMP **	Yellow	Gray

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
STANDBY GENERATOR	**	Red	Green
STARTING AIR	COMPRESSOR **	Orange	Green
STARTING AIR	TANK **	Orange	Green
STEAM BOILER	**	Blue	Orange
SUMP PUMP	**	Black	Gray
SUMP PUMP – CONC.	TANK **	Black	Gray
SUMP PUMP – DIGEST.	TANK **	Black	Gray
SUMP PUMP – EFF.	VAULT **	Black	Gray
SUPPLY FAN	**	White	Charcoal
THICKENER	**	White	Black
TRASH RACK	**	Black	Gray
UNIT HEATER – STEAM	**	White*	Charcoal*
UNIT HEATER – WATER	**	White	Charcoal*
WASTE LUBE OIL	PUMP **	Black	White
WASTE LUBE OIL	TANK **	Black	White
WATER TREATMENT	PUMP **	Brown	Yellow
WATER TREATMENT	TANK **	Brown	Yellow

(1) Nominal limit of 18 letters, numerals and spaces.
(2) Nominal limit of 17 letters, numerals and spaces.

*Where equipment is mounted on roofs or where exposed to the public view, such as in lobby or office areas, the color will be selected by the Architect.

**The legend on these nameplates also includes the appropriate six-digit numeral and letter designation for such equipment and structures as specified by the Operation and Maintenance Manual.

SCHEDULE 40 05 97-6
PIPELINE AND EQUIPMENT IDENTIFICATION

Abbr.:	**Process/Service Line:**	**Fed. Std. 595B Color:**
AD	Aerator Drain	Gray 16187
APLM	Anionic Polymer	Green 14090
BLW	Balance Water	Blue 15193
BLO	Blower Lube Oil	White 17925
CPLM	Cationic Polymer	Green 14090
CSTC	Caustic (Sodium Hydroxide)	Orange 22544
CEN	Centrate	Gray 16492
CF	Centrifuge Feed	Black 14036
CHA	Channel Air	Green 14260
CHWR	Chill Water Return	Blue 17877
CHWS	Chill Water Supply	Blue 15450
CHEFF	Chlorinated Effluent	Gray 17875
CW	City Water	Blue 15200
CLD	Clarifier Drain	Gray 16187
CLWR	Cold Water Return	Blue 15187
CLWS	Cold Water Supply	Blue 15125
CA	Compressed Air (Plant Air)	Green 14449
CCSK	Concentrated Skimmings	Tan 17778
CSB	Concentrator Subnatant	Gray 16314
C	Condensate	Gray 16357
CTD	Contact Tank Drain	Gray 16187
DFM	Defoamant	Pink 11630
DGOF	Degrit Overflow	Gray 16250
DGS	Degritted Primary Sludge	Olive 14257
DWS	Dewatered Sludge	Navy 15044
DF	Diesel Fuel	Mustard 13275

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
DSD	Digested Sludge Disposal	Brown-black 10032
RCD	Digested Sludge Recirculation (mixing)	(See Note 1)
DSR	Digested Sludge Recycle	Black 14084
DSS	Digested Sludge to Storage	Black 17038
DST	Digested Sludge Transfer	Gray 16081
DSK	Dilute Skimmings	Tan 16405
ELF	Elutriation Feed	Black 15042
ECWR	Engine Cooling Water Return	Gray 15526
ECWS	Engine Cooling Water Supply	Navy 15045
EXH	Engine Exhaust	Stainless Steel Jacket
ELO	Engine Lube Oil	White 17925
FECL	Ferric Chloride	Blue 15095
FEF	Final Effluent	Gray 16492
FRS	Fire and Standpipe	Red 11350
FW	Flushing Water	Blue 15090
FF	Fuel Fill	Tan 10266
FO	Fuel Oil	Brown 16160
	Gasoline Fill Port – high octane	Red 11086
	Gasoline Fill Port – middle octane	Blue 15056
	Gasoline Fill Port – low octane	White 17925
	Gasoline Fill Port, unleaded – high octane	Red 11086 with white 17925 cross
	Gasoline Fill Port, unleaded – middle octane	Blue 15056 with white 17925 cross
	Gasoline Fill Port, unleaded – low octane	White 17925 with black 17038 cross
	Gasoline Vapor Recovery	Orange 12246
GRIT	Grit	Gray 14064
HPAR	High Pressure Air (Plant Air)	Green 14272

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
DG(H)	High Pressure Digester Gas	Orange 22510
HPUGS	High Pressure Utility Gas	Orange 22510
HWR	Hot Water Return (heating)	Orange 12215
HWS	Hot Water Supply (heating)	Orange 11400
HVACEX	HVAC Exhaust	Gray 14158
HVACR	HVAC Return	Gray 14077
HVACS	HVAC Supply	Gray 14056
HCW	Hydraulic Control Water	Blue 15107
HOR	Hydraulic Oil Return	Brown 10059
HOS	Hydraulic Oil Supply	Brown 10045
ITK	Intake (Engine Air)	Green 14672
JKWR	Jacket Water Return	Gray 15109
JKWS	Jacket Water Supply	Navy 15050
	Kerosene Fill Port	Brown 20100
LM	Lime	Tan 13740
DG(L)	Low Pressure Digester Gas	Orange 22510
LPUGS	Low Pressure Utility Gas	Orange 22510
LF	Lube Fill	White 17925
MH	Methanol	Brown 10233
MS	Mixed Sludge (heating)	(See Schedule 40 05 97-7)
ODCDW	Odor Control Draw	Green 14110
ODCVT	Odor Control Vent	Unpainted
O2	Oxygen	Red 11105
OZR	Ozone Recycle	Blue 15177
OZS	Ozone Supply	Blue 15080
OZVT	Ozone Vent	Blue 15180
PD	Plant Drain	Gray 16187

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
PW	Plant Water	Blue 15092
PTPM	Potassium Permanganate	Red 11140
PEFF	Primary Effluent	Gray 16251
PA	Process Air	Green 14115
RINF	Raw Influent	Gray 16293
RPS	Raw Primary Sludge	Olive 14151
RSC	Raw Screenings	Tan 16350
RAS	Return Activated Sludge	Tan 10260
SMP	Sampling Line	(Match to Service)
SLW	Seal Water	Blue 15182
SBP	Secondary Bypass	Gray 16473
SAR	Service Air (Plant Air)	Green 14193
SW	Service Water	Blue 15102
SHW	Sludge Heating Water	Orange 12473
NA2SO3	Sodium Bisulfite	Black 14084
NAOCL	Sodium Hypochlorite	Yellow 13591
SPW	Spray Water	Navy 15052
STA	Starting Air (Engine Air)	Green 14187
STMR	Steam Return (Condensate)	Tan 11670
STMS	Steam Supply	Orange 22356
STD	Storm Drain	Gray 16440
SULAD	Sulfuric Acid	Brown 10049
SD	Sump Drain	Gray 16376
SU	Supernatant	Gray 16307
TS	Thickened Sludge	Brown 10070
TD	Thickener Drain	Gray 16187
TO	Thickener Overflow	Gray 16329

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
VCS	Vacuum Service	Green 14062
WAS	Waste Activated Sludge	Tan 13596
WDGS	Waste Digester Gas	Orange 22510
WML	Waste Mixed Liquor	Tan 12648
WO	Waste Oil	White 17925
WSC	Washed/Compacted Screenings	Black 14084

SCHEDULE 40 05 97-7

MIXED SLUDGE AND DIGESTED SLUDGE RECIRCULATION PIPELINE AND EQUIPMENT IDENTIFICATION

Digester No.:	**Color:**	**Digester No.:**	**Color:**
1	13531	5	10219
2	13522	6	10115
3	10324	7	10080
4	10371	8	10055

SECTION 40 06 01 – SCHEDULE FOR EXPOSED PIPING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish, install, and test all exposed piping as indicated in the exposed piping schedule, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	2
2.03	Fabrication / Assembling / Finishes	2
2.04	Source Quality Control / Shop Tests	2
PART 3	EXECUTION	2
3.01	Examination / Preparation	2
3.02	Installation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	3
3.05	Adjusting / Protection / Cleanup	3

C. The following schedule(s), attached after the End of Section designation, are a part of this Section:

1. Schedule 40 06 01-1, Exposed Piping Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. 40 05 05 – Exposed Piping Installation

B. 40 05 05.30 – Leakage Testing for Exposed Piping
C. 40 05 06 – Couplings, Adapters, and Specials for Process Piping
D. 40 05 07 – Hangers and Supports for Process Piping
E. 40 05 22 – Steel and Stainless Steel Process Pipe

1.04 REFERENCES
A. Not Used

1.05 DESCRIPTION
A. Not Used

1.06 QUALITY ASSURANCE
A. Not Used

1.07 SUBMITTALS
A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING
A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES
A. Not Used

1.10 WARRANTY
A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Not Used

2.02 MATERIALS / EQUIPMENT
A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES
A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS
A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION
A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 40 06 01-1
EXPOSED PIPING SCHEDULE

Service	Nominal Size (in)	Material	Wall Thickness/ Schedule/ Class	Type of Joint	Type of Fitting	Maximum Static Pressure (psig)	Design Pressure (psig)	Test Pressure (psig)	Surge Pressure (psig)	Pipe Protection	
										Interior	Exterior
PIPE (Outside I & C TWR)	48	STEEL	.50"	Welded Butt Strap	STEEL	74	150	150	N/A	Polyurethane	-
INLET PIPE (Inside I & C TWR)	30	STEEL	.375"	MECH FLANGE	STEEL	74	150	150	N/A	Polyurethane	Epoxy
6-inch Steel Drain Pipe	6	STEEL	Class 80	Welded Butt Strap	STEEL	74	150	150	N/A	Polyurethane	-

B. The following service abbreviations are used in Schedule 40 06 01-1:

Service:	Abbrev:	Service:	Abbrev:
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--

C. The following pipe material abbreviations are used in Schedule 40 06 01-1:

Pipe Material:	Abbrev:	Pipe Material:	Abbrev:
304L Stainless Steel	304L SS	Ductile Iron	DI
316L Stainless Steel	316L SS	Fiber-Reinforced Plastic	FRP
Brass	Brass	High Density Polyethylene	HDPE
Carbon Steel	CS	Polytetrafluoroethylene	PTFE
Chlorinated PVC	CPVC	Polyvinyl Chloride	PVC
Copper	Cu	Stainless Steel	SS

D. The following joint type abbreviations are used in Schedule 40 06 01-1:

Joint Type:	Abbrev:	Joint Type:	Abbrev:
Bell and Spigot	BS	Push-on Joint	POJ
Brazed	Brz	Shouldered End Coupling	SEC
Butt Weld	BW	Split-sleeve Coupling	SSC
Flanged	Flg	Soldered	Sld
Flexible Tube Connector	Flex	Solvent Weld	SW
Grooved End Coupling	GEC	Restrained Mechanical Joint	RMJ
Grooved / Shouldered End Coupling	GSEC	Restrained Push-on Joint	RPOJ
Lap Welded	LW	Threaded	Thd
Mechanical Joint	MJ	Welded	Wld

E. The following interior coating abbreviations are used in Schedule 40 06 01-1:

Interior Coating	Abbrev:	Interior Coating:	Abbrev:
Asphalt Coated	AC	Cement Lined	CL
Basalt Coated	BC	EPDM (M-class) Rubber	EPDM
Ceramic Epoxy Coated	CEC	Glass Lined	GL
Ceramic Epoxy Lined	CEL	Polyethelene Lined	PEL

F. The following exterior coating and treatment abbreviations are used in Schedule 40 06 01-1:

Exterior Coating, Treat.:	Abbrev:	Exterior Coating, Treat.:	Abbrev:
Asphalt Coated	AC	Galvanized	Galv
Epoxy	Epx	Insulate	I
Heat Trace	HT	Paint	P

G. The following testing abbreviations are used in Schedule 40 06 01-1:

Test Type:	Abbrev:	Exterior Coating, Treat.:	Abbrev:
Hydrostatic	Hyd	--	--

SECTION 40 61 13 - PMCS GENERAL REQUIREMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate and place in operation a complete PMCS. The PMCS shall be as specified in this Section, the Sections listed in the Related Sections of this Section, and as shown on the Contract Drawings.

B. PMCS shall be designed to control, monitor, store, display and log process and equipment operating information and alarms and to perform various control functions and generate various alarms.

C. The unit processes which the PMCS shall control and monitor are shown on the Contract Drawings and described herein.

D. Contractor shall coordinate with all PMCS equipment manufacturers to ensure that all control and instrumentation signals are incorporated properly.

E. Contract drawings, Specifications of Division 40 and the Related Sections of this Section illustrate and describe the overall PMCS functional and operational requirements.

F. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	5
1.06	Quality Assurance	6
1.07	Submittals	13
1.08	Delivery, Storage, and Handling	19
1.09	Spare Parts, Special Tools, and Supplies	20
1.10	Warranty	20
PART 2	PRODUCTS	20
2.01	Manufacturers	20
2.02	Materials / Equipment	21
2.03	Fabrication / Assembling / Finishes	23
2.04	Source Quality Control / Shop Tests	24
PART 3	EXECUTION	24
3.01	Examination / Preparation	24
3.02	Installation	24
3.03	Field Testing / Quality Control	24
3.04	Startup / Demonstration	24
3.05	Adjusting / Protection / Cleanup	24

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 - Grounding.

B. Section 26 05 53 - Identification for Electrical Systems.

C. Section 26 29 13 - Enclosed Controllers

D. Section 40 61 26 - PMCS Training

E. Section 40 61 93 - PMCS Input Output List

F. Section 40 61 94 - PMCS Instrument Index

G. Section 40 61 95 - PMCS Monitoring and Control Criteria

H. Section 40 61 96 - PMCS Control Strategies

I. Section 40 63 43 - PMCS Programmable Logic Controllers

J. Section 40 67 16 - PMCS Panels and Enclosures

K. Section 40 78 90 - PMCS Panel Mounted Instruments and Devices

L. Section 40 79 91 - PMCS Field Instruments

M. Section 40 80 81 - PMCS Factory Testing

N. Section 40 80 82 - PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. AI - Analog Input
2. AO - Analog Output
3. Area Process - A number of unit processes grouped either because of their similar equipment operation or similar function in a Plant. Area Process also comprise groupings of dissimilar unit processes designated a single group function.
4. CPU - Central Processing Unit
5. CS - Control Strategy

6.	DEP BIT	-	DEP Bureau of Business Information Technology.
7.	DI	-	Digital Input
8.	Distributed I/O	-	Hardware specifically designed to function as Remote I/O.
9.	Distributed Control System	-	A control system comprising Unit and Area Process connected by a communication network which facilitates control and monitoring of the entire system from a central point such as a Plant control room.
10.	DO	-	Digital Output
11.	Fixed PLC	-	PLC whose hardware configuration comprises a fixed number of I/O, a CPU and power supply all in one enclosure.
12.	HMI	-	Human Machine Interface are electronic displays and windows providing operator access to monitor access, and set parameters of a Unit Process control system.
13.	I/O	-	Input/Output
14.	Modular	-	A style of PLC assembly where I/O, CPU and power supply are each mounted in cards which are insertable to a mounting chassis or backplane.
15.	OAD	-	Operational Availability Demonstration
16.	OIT	-	Operator Interface Terminal; another name for HMI.
17.	Control Panel	-	Control Panel includes any enclosure provided to house electrical equipment, instrumentation, controls wiring terminations, network hardware or connections, indicators, displays, computer hardware, panels of packaged systems etc. provided under any Section of this Contract
18.	P&ID	-	Process and Instrumentation Diagrams included in the Contract Documents.
19.	PLC	-	Programmable Logic Controller

20.	PMCS	-	Process Monitoring and Control System
21.	Remote I/O	-	Any I/O that functions physical remote from the location of the CPU and I/O located on its backplane.
22.	SFT	-	Start-up and Field Testing
23.	Unit Process	-	Any standalone equipment or process operation such as a pump in which all the logic for control of the equipment or process resides in the local installation.
24.	URT	-	Upset and Recovery Testing
25.	WFAT	-	Witnessed Factory Acceptance Tests

B. Reference Standards

The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction, in addition to specific details in this Section and the Contract Drawings:

1.	BWT PDS	-	BWT Design Guideline, Program Development Standards.
2.	BWT PLC	-	BWT Design Guideline, Programmable Logic Controllers.
3.	BWT SCADA	-	BWT Design Guideline, SCADA Software.
4.	ISA 5.1	-	Instrumentation Symbols and Identification
5.	ISA 5.2	-	Binary Logic Diagrams for Process Operations
6.	ISA 5.3	-	Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
7.	ISA 5.4	-	Instrument Loop Diagrams.
8.	ISA 5.5	-	Graphic Symbols for Process Displays.
9.	ISA 18.1	-	Annunciator Sequences and Specifications.
10.	ISA 18.2	-	Management of Alarm Systems for Process Industries.
11.	ISA TR20.00.01	-	Specification Forms for Process Measurement and Control Instruments Part1: General Considerations.
12.	ISA 51.1	-	Process Instrumentation Terminology.

13.	ISA RP60.3	-	Human Engineering for Control Centers.
14.	ISA 101	-	Human Machine Interfaces for Process Automation Systems.
15.	NEMA 250	-	Enclosures for Electrical Equipment (1000 Volts Minimum).
16.	NEMA ICS 1	-	Industrial Control and Systems General Requirements.
17.	NEMA ICS 2	-	Industrial Control and System Controllers, Contactors and Overload Relays Rated 600V.
18.	NEMA ICS 4	-	Terminal Blocks.
19.	NFPA 79	-	Electrical Standard for Industrial Machinery.
20.	NEC (NFPA 70)	-	National Electrical Code
21.	MIL-STD -1916	-	DOD Preferred Methods for Acceptance of Product.
22.	UL 508	-	Industrial Control Equipment.
23.	UL 1059	-	Terminal Blocks.

1.05 DESCRIPTION

A. The PMCS shall be a PLC-based control system.

B. The system shall comprise unit processes organized into major process areas and a central monitoring and control point.

C. Unit processes shall be fully capable of accomplishing control, monitoring, storing and logging equipment operation at local point.

D. Unit Processes shall have the ability to transfer control to remote Area Control points or a remote Central Control point.

E. The system includes the following major equipment and all other appurtenances listed in the various Division 40 Sections:

F. Environmental Conditions:

1. The PMCS shall be designed and constructed for continuous operation under the following temperature and humidity conditions:

a. Control Rooms

1) Ambient Temperature

a) Normal Range 60º F to 80º F

b) Extremes 40º F to 105º F.

2) Relative Humidity

a) Normal 80 percent

b) Maximum 95 percent

b. Indoor locations

1) Ambient Temperature 40º F to 120º F.

2) Relative Humidity 98 percent maximum.

c. Outdoor locations

1) Ambient Temperature -10º F to 120º F.

2) Relative Humidity 100 percent maximum.

1.06 QUALITY ASSURANCE

A. Criteria

1. The PMCS facilities outlined in the Contract Documents and included herein have been designed to meet stringent quality standards. The criteria for selection of this system include, but are not limited to the following:

a. The use of standard, "non-custom" equipment and application software.

b. The ability of City's personnel to make modifications and adjustments in the field to react to actual field conditions.

c. The ability of City to obtain training of City's personnel in a well-established equipment manufacturer training program.

d. The availability of factory service and a well-stocked spare parts inventory, which could be drawn upon by the City in emergency situations.

B. PMCS Supplier

1. The PMCS shall be furnished by a single Supplier who shall assume responsibility for providing a complete and integrated system.

2. The system is to contain products of a single manufacturer, when possible, and to consist of equipment models, which are currently in production.

3. The Supplier shall identify those system components, which are not of his manufacture.

4. The Supplier shall supply his company's quality assurance plan, and for components which are not of his manufacture, the component manufacturer's quality assurance plan. The plans shall include but not necessarily be limited to:

a. Method of testing, raw material criteria, methods of documentation, station control, "Burn-In", final tests and serialization coding and packaging.

b. Plans should be in accordance with M.I.L.-STD-1916.

C. Supplier's Qualifications

1. Shall be a financially sound firm having at least ten (10) years continuous experience in designing, implementing, supplying and supporting instrumentation and control systems, which are comparable to the PMCS in terms of hardware, software, cost and complexity.

2. Shall have manufactured and supported standard lines of digital processing and control equipment and application software continuously for the last ten (10) years.

3. Shall have in existence at the time of bid advertisement, an experienced Engineering and Technical staff capable of designing, implementing, supplying and supporting the PMCS and handling the PMCS submittal and training requirements.

4. Shall provide system hardware components and software packages of fully developed, field proven standardized designs and therefore shall furnish a system which is not a highly unique, custom one-of-a-kind system.

5. Shall have a minimum of ten (10) years' experience in operator interface software configuration and hardware application and programming of distributed microprocessor based controllers and data highway systems.

6. Shall provide standard course offerings in general process control applications and in operation, programming and maintenance of the control system and equipment at a facility specifically utilized for training purposes. The facility shall have been in operation continuously for the last ten (10) years.

7. Shall have a thorough working knowledge of dam operation and control philosophy in accordance with standard practices of the industry.

8. Shall have a system of traceability of the manufactured units and purchased components through production, assembly and testing.

9. Shall have a system of "Burn-In" for all components and available supportive documentation.

10. Shall have a demonstrated record of prompt response to field failures.

11. Shall have a documented program of failure analysis.

12. Shall have a UL approved panel shop.

13. Shall have a record of prompt shipments in accordance with Contract obligations required for previous projects.

D. Technical Proposal Requirements

1. The Contractor shall submit a copy of a Technical Proposal from the Supplier which he has selected to provide the PMCS.

2. The Technical Proposal shall be complete and at a minimum contain all information as specified below:

a. Financial Statement

1) Shall include the value of distributed microprocessor based control systems delivered during the last five (5) fiscal years.

2) Shall include the value of other process instrumentation and controls shipped during the period.

b. Experience

1) Shall provide evidence of compliance with the specific experience requirements under the Supplier Qualification listed in this Section in the form of an experience certification signed by an officer of the company.

2) Shall furnish list of last ten (10) projects completed.

3) Shall describe at least three (3) completed municipal projects utilizing instrumentation and control equipment identical to or similar to (indicate which) that specified in this Section.

4) Shall indicate project name, value, completion date, names and phone numbers of representatives familiar with each project.

5) Letters of recommendation submitted does not relieve the Contractor from complying the requirements in this Section

c. Personnel

1) Shall provide a listing of those personnel committed to be assigned to the Contract.

2) List shall include Project Manager, Project Engineer, Field Representative, Local Service Representative, and Sales Representative.

3) Shall identify addresses of personnel not based at supplier's main office.

4) Shall provide documentation including resumes of personnel demonstrating experience in dam operations.

d. Exceptions

1) Shall list all exceptions and deviations from the requirements of the Contract.

2) Shall reference the Drawing Number, Section number, article, and paragraph of proposed variance and provide an explanation of why the proposed exception or deviation meets (or exceeds) the functional or equipment requirements specified.

e. Shipment Records

1) Shall provide evidence of timely delivery of equipment on past projects.

f. PMCS Hardware and Software:

1) Shall provide a general system configuration drawing and include designations for model numbers and types of the proposed distributed control system components and all other proposed system components.

2) Shall provide descriptive literature and manufacturer's catalog information covering all aspects of the hardware design and software functions and capabilities of the specific distributed control system and data highway system proposed for the PMCS.

3) Shall provide descriptive literature and catalog information covering the features and capabilities of all proposed hardware components.

4) Shall describe standard software packages proposed, including any customized software required to meet the functional intent of the system Specifications.

5) Descriptions shall address the following:

a) Overview of system software including the functions, organization and interrelationship of the major software modules provided.

b) Estimated memory requirements to accomplish the specified graphic display, logging, reporting and alarming functional requirements.

c) Examples of graphic displays, methods of display access and procedures for display definition and generation, including use of the standard symbols library and capabilities for generating and storing user defined symbols in the symbol library.

d) Real-time data logging and reporting software features and capabilities including examples of logs and reports, procedures for automatic reporting and logging file setups, limitations on sampling and computing frequency for data acquisition and

logging, and utilities for log file and report modifications and file maintenance.

e) Alarm handling software features and capabilities including an alarm display example, methods of defining alarms and alarm files, automatic printing of alarms, acknowledgements and return to normal conditions, chronological sorting and time-tagging of alarms, and alarm file maintenance utilities.

f) Distributed system programming and documentation software features and capabilities, including screen display and printout examples for a fully annotated and cross-referenced ladder diagram and the ladder diagram elements.

g) Use of system level diagnostics for monitoring the performance of and detecting and reporting faults associated with the distributed communications data highway.

g. Instrumentation and Panel Mounted Devices

1) The Contractor shall provide descriptive literature and catalog cuts for each type of sensor, transmitter, indicator, and other such devices required by the Contract.

h. Training

1) The Contractor shall provide information and literature as to the organization proposed and the factory facilities to be utilized for the training specified.

2) Indicate the qualifications of the factory training staff.

i. Availability Demonstration

1) The Contractor shall indicate how the Availability Demonstration will be accomplished.

j. Maintenance

1) The Contractor shall provide the following information:

a) Location of service facility along with minimum and maximum response time.

b) Location of parts facility with delivery time and method.

E. Supplier's Responsibility:

1. The Contractor shall retain the PMCS supplier to assume the responsibilities specified below. However, execution of these specified

duties by the System Supplier shall not relieve the Contractor of the ultimate responsibility for the PMCS.

a. Design, fabrication, implementation and applications programming of the PMCS and all subsystems in accordance with the Contract Documents and all referenced standards and codes.

b. Preparation, assembly and correction of all PMCS submittals in accordance with the Contract Documents.

c. Proper interfacing of the PMCS hardware, software, field devices and panels, including required interfacing with packaged control systems furnished by other equipment suppliers, and with the Facility's PMCS.

d. Supervision of the installation of PMCS, instruments, panels, consoles, cabinets, wiring and other components required.

e. Calibration, testing and start-up of the PMCS.

f. Training of The City personnel in operation and maintenance of the PMCS.

g. Handling of all warranty obligations for the control system components.

h. Maintenance of two (2) reproducible copies of the complete PMCS system and running software at the supplier's facility for the duration of the warranty period.

1) Software copies shall be maintained on the bulk storage medium used by the supplier for system program development and shall be directly loadable on the supplied system.

F. Coordination and Progress Meetings:

1. The Contractor shall be responsible for the scheduling and coordinating the system installation with regard to all other work on the site and in accordance with the provisions of the General Conditions. Said coordination shall be documented on the project schedule.

2. Routine progress and coordination meetings will be scheduled by Engineer. The Contractor and a representative of the System Supplier shall be required to attend a minimum of one meeting per month for the length of Contract.

3. The purpose of the meetings shall be to review the progress of the work involving the PMCS and provide coordination for installation of the equipment to ensure construction schedules are met.

4. Representatives at the meetings shall have the competence and authority to make any and all necessary decisions. Decisions and statements made

at the meetings shall commit the Contractor and the System Supplier to agreed procedures and schedules.

G. System Supplier Project Personnel

1. The Contractor shall require the System Supplier to provide the following project personnel:

a. Project Manager

1) The System Supplier shall appoint a Project Manager who shall coordinate and schedule all work and assure that the Contract schedule is met.

2) The Project Manager shall have a minimum of ten (10) years' experience in coordination, scheduling and delivery of instrumentation and control contracts under similar Dam Facilities as this Contract thorough working knowledge of contract administration as both a prime and sub-prime Vendor/Contractor.

3) The Project Manager shall act as the liaison with the Contractor for the installation of the PMCS and shall assist in all matters required for proper coordination and interfacing of the equipment and processes.

b. Field Engineer

1) The System Supplier shall appoint a Field Engineer with responsibilities as follows:

a) Provide advice and technical consultation relative to installation techniques and procedures for equipment furnished.

b) Installed system checkout, calibration, adjustment and start-up including tuning of every control loop.

c) Maintenance services during availability demonstration.

d) Involvement in the on-site system training of pumping station personnel.

e) Resolving of control problems encountered during initial start-up and testing of all PMCS monitoring equipment.

2) The Field Engineer shall have a minimum of ten (10) years' experience in systems engineering and start-up and shall have a thorough working knowledge of both the hardware and software supplied for the PMCS.

c. Training Personnel:

1) Comply with requirements of Section 40 61 26 - PMCS Training.

1.07 SUBMITTALS

A. Shop Drawings General

1. The Contractor shall submit Shop Drawing and material specifications for the approval of the Engineer.

2. Shop Drawing preparation shall not commence until after the pre-submittal conference specified below.

3. Manufacture of the PMCS shall not commence until related and interfacing equipment submittals have been approved by the Engineer.

4. Shop Drawings shall be submitted in complete packages grouped to permit review of related items as generally outlined in this Section under Submittal Requirements.

5. Review of Shop Drawings will be for conformance with Contract Documents and with regard to functions specified to be provided.

B. Pre-Submittal Conference

1. The Contractor shall arrange and conduct a pre-submittal conference on the PMCS within forty-five (45) days of notification of preliminary acceptance of the proposed PMCS and Supplier by the City and the Engineer.

2. The Pre-submittal conference shall be attended by representatives of Contractor, the PMCS Supplier, and the Engineer. The Contractor shall allocate one (1) full working day for the conference and that time shall be included in the price of this Contract. The meeting shall be held at the [Plant] or location approved by the Engineer.

3. The purpose of the pre-submittal conference shall be to review informally and approve the manner in which the control system supplier intends to respond to the Contract requirements before any submittals are prepared.

4. Contractor shall prepare the items listed below for presentation at the pre-submittal conference. The information shall be submitted to Engineer four (4) working weeks prior to the date of the conference.

a. List of equipment and materials required for the PMCS and the brand and model which Contractor proposes to use for each item or component of the proposed system.

b. List of proposed exceptions to the plans and specifications along with a brief explanation of each.

1) Approval of exceptions and substitution shall be subject to a formal submittal according to the Contract procedure.

c. Sample of each type of submittal specified herein. These may be submittals prepared for other projects.

d. A flow chart showing the steps to be taken in preparing and coordinating each control system submittal to the Engineer, and a list of proposed submittals.

e. Schedule for all PMCS related activities from the pre-submittal conference through start-up and training.

1) Particular emphasis shall be given to dates relative to submittal, design, fabrication, programming, factory testing, delivery, installation and field testing.

2) The schedule shall be subdivided to show activities relative to each major item or group of items when everything in a given group is on the same schedule.

3) Schedule shall conform to requirements for Contract schedules.

f. General outline of the type of tests to be performed to verify that the PMCS and all its components including sensors/transducers, instruments and digital processing equipment are functioning properly.

C. Sensors/Transducers and Panel Instruments.

1. Submit product information for all sensors/transducers and panel instruments. Include the following:

a. Manufacturer's product name and model number.

b. Instrument tag number from Contract Documents.

c. Manufacturers’ standard catalog product data.

d. Description of construction features.

e. Performance and operation data.

f. Installation and mounting details, instructions and recommendations.

g. Service requirements.

h. Dimensions.

D. PMCS Information:

1. System Description

a. Detailed block diagram showing system hardware configuration and identifying model numbers of system components.

b. Software language and organization:

1) Format, protocol and procedures for data highway communications and local communications with input/output modules and peripheral devices.

2. HMI details:
   a. Control and failure modes;
   b. On line and off line capabilities for programming, system utilities and diagnostics;
   c. Input/output point listing with I/O module cross reference identification for each distributed controller;
   d. Data base listing including all input/output points;
   e. Suggested detailed format and configuration of all log reports, alarm summaries, printer outputs, displays and graphics;
   f. List of spare parts and test equipment.
3. Equipment Hardware
   a. Layout drawings showing front, rear, end and plan views to scale of all processing equipment, I/O components, power supplies and peripheral devices.
   b. Construction details, features and procedures.
   c. Interconnection diagrams including termination details, cable identification list and cable length.
   d. Plans showing equipment layout in control panels.
   e. Installation requirements, instructions and/or recommendations
4. Software Description
   a. Standard technical documentation covering all aspects of the PMCS software functions and capabilities, including instruction set description and programming procedures related to control, monitoring, display, logging, reporting and alarming functions
   b. Standard technical and instructional documentation covering software for utility, system support, system documentation, display, communications, data logging and storage and diagnostic functions.
   c. Detailed functional descriptions of application programs explaining control, display, logging and alarming features to be provided and functions to be performed.
   d. Documentation describing memory type, size and structure and listing size of system memory, I/O and data table memory and size of memory available for control programs. Also define estimated

control program memory requirements and processor execution times and program scan times.

e. Documentation describing central monitoring station main and secondary memory type size and requirements to perform the display, logging, reporting and alarming functions required.

5. Panels, Consoles and Cabinets Information:

a. Layout Drawings shall include the following:

1) Front, rear, side, end and plan views to scale.

2) Dimensional information

3) Tag number and functional name of components mounted in and on panel, console or cabinet.

4) Product information on all panel components.

5) Nameplate location and legend including text, letter-size and colors to be used.

6) Location of anchoring connections and holes.

7) Location of external wiring and/or piping connections.

8) Mounting and installation details.

9) Proposed layouts and sizes of graphic display panels.

10) Calculations for heating and cooling.

b. Wiring and/or piping diagrams shall include the following:

1) Name of panel, console or cabinet.

2) Wiring sizes and types.

3) Piping sizes and types.

4) Terminal strip numbers.

5) Color coding

6) Functional name and manufacturer's designation for components to which wiring and piping are connected

c. Electrical control schematics in accordance with NFPA 79.

d. Plan showing equipment layout in each area.

6. Field piping diagrams shall include the following:

a. Piping sizes and types.

b. Location, functional name and manufacturer's designation of items to which piping is connected.

7. Instrument loop diagrams for all analog display, control and I/O loops prepared using ISA standard symbols in accordance with ISA 5.4 shall include the following:

a. Instrument tag numbers from Contract Documents.

b. Functional name of each item

c. Manufacturer's model, product, or catalog number for each item.

d. Location of each item

8. ISA Data Sheets:

a. ISA Data Sheets shall comply with ISA–TR20.00.01–2001 requirements and shall be computer generated.

b. All field and panel instruments ISA Data Sheets shall contain the following information, as a minimum.

1) Tag number in accordance with Section 40 96 20 – Pump Monitor and Control System Instrument Index and Contract Drawings;

2) Product (item) name used herein and on the Contract Drawings;

3) Name of manufacturer or supplier;

4) Manufacturer's complete model number;

5) Location of the device;

6) Input-output characteristics;

7) Range, size, and graduations;

8) Physical size with dimensions, NEMA enclosure classification and mounting details;

9) Materials of construction of all components;

10) Instrument or control device sizing calculations, where applicable;

11) Certified calibration data on all flow metering devices, where applicable;

12) Environmental requirements during storage and operation.

9. PMCS I/O Loop Wiring Diagrams

a. Contractor shall prepare drawings on a module-by-module basis and include the following information:

1) Rack numbers, slot number, module type and module terminal point numbers. Also, include location and identification of all intermediate panel terminal block and strip numbers to which I/O wiring and power supply wiring is connected. Identify all power supply circuit numbers and ratings.

2) Wiring sizes, types, wire numbers and color-coding.

3) Location, functional name, tag numbers and manufacturer model numbers of panel and field devices and instruments to which I/O wiring is connected. For discrete I/O devices,

use JIC electrical symbols tagged with designation shown on P&IDs.

E. PMCS Operation and Maintenance (O&M) Manuals

1. The Contractor shall furnish O&M manuals for the PMCS in accordance with the Section 01 78 25 – Operation and Maintenance Manuals, this Section and the following minimum requirements:

a. Name, address and telephone number of the PMCS Supplier's local service representative.

b. Complete list of supplied system hardware parts with full model numbers referred to system part designations, including spare parts and test equipment provided.

c. Copy of all approved submittal information and system shop drawings as specified herein with corrections made to reflect actual system as tested and delivered to the site for installation.

d. Half-size black line reproductions shall be provided for all shop drawings larger than 11 by 17 inches.

e. All drawings shall be 11 by 17 inches minimum size.

1) Drawings 8-1/2 by 11 inches are not acceptable.

f. Manufacturer's Original Copies of Hardware, Software and Installation, Assembly and Operations Manuals for the PMCS central monitoring station and peripheral devices, and all other control system components.

g. Manuals shall include the following information:

1) General descriptive information covering the basic features of the equipment

2) Physical description covering layout and installation requirements and all environmental constraints.

3) Functional and operational descriptions covering the procedures for programming, operation, start-up, shutdown, and calibration of the distributed control system equipment and explaining how the various control functions are performed.

4) Principles of operation explaining the logic of operation; provide information covering operation to a component level.

5) Maintenance procedures covering checkout, troubleshooting, and servicing.

a) Checkout procedures shall provide the means to verify the satisfactory operation of equipment,

b) Troubleshooting procedures shall serve as a guide in determining faulty components and

c) Servicing procedure shall cover requirements and recommended time schedule for calibration, cleaning, lubrication and other housekeeping and preventive maintenance procedures.

6) Wiring, schematic and logic diagrams.

7) Safety considerations relating to operation and maintenance procedures.

F. Record Drawings and Documentation

1. The Contractor shall require the System supplier to revise all system shop drawings, submittals and software documentation to reflect as-built conditions in accordance with the requirements of the Contract Documents and the supplemental requirements.

2. All revised shop drawings and documentation shall be submitted to the Engineer per Section 01 78 40 – Final Record Documents to replace outdated drawings and documentation contained in the system O&M Manuals.

3. Half-size black line sets shall be provided for all drawings larger than 11 x 17. Specific instructions for outdated drawing removal and replacement shall be provided with the record drawing submittal.

4. Half-size black line prints of wiring diagrams applicable to each control panel shall be provided inside a clear plastic envelope and stored in a suitable print pocket or container inside each control panel.

G. Reports:

1. The following report shall be submitted shall be submitted to the Engineer:

a. Factory Test Reports as specified in Section 40 80 81 - PMCS Factory Testing.

b. Installation Inspection, Field Calibration, and Field Testing. Reports, as specified in Section 40 80 82 - PMCS Factory Testing.

c. Training as specified in Section 40 61 26 – PMCS Training.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The PMCS equipment shall be delivered, stored and handled in accordance with the Sections listed under Related Specification of this Section, the Specifications, the manufacturer’s recommendations and the following:

1. PSMCS equipment shall be packaged at the factory prior to shipment to site, to protect each item from damage during shipment and storage.

2. Containers shall be protected against impact, abrasion, corrosion, discoloration and/or other damages.

3. Clearly label contents of each container and provide information on the required storage conditions necessary for the equipment.

4. PMCS equipment shall be inspected for shipping damage or loose parts when received.

5. Evidence of water which may have entered equipment during transit shall be checked.

6. PMCS equipment shall be lifted, rolled or jacked into locations shown on the Contract Drawings.

7. PMCS equipment shall be stored in a clean, dry location in which a uniform temperature is maintained.

8. PMCS equipment shall be protected in storage with suitable covering and air circulation maintained to ensure the equipment is kept dry and free from condensation.

9. Where dampness or condensation may be encountered, heaters shall be provided for equipment to prevent moisture damage.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall furnish and deliver to the Engineer, at that part of the site and at such time as the Engineer may direct, spare parts for the PMCS in accordance with the Sections listed under Related Specifications of this Section.

B. The spare parts shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the manufacturer's part number with complete information for use and reordering.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS/s shall be as manufactured by:

1. Optimum Controls Corp, Reading, PA;

2. Siemens Industry Inc., Washington, DC;

3. A.K. De Rama Industrial Control System Inc., Mountainside, NJ;

4. Avantech, Inc., Columbia, SC;

5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Design Criteria

1. Power Supplies:

a. All electrically powered equipment and devices shall be suitable for operation on 115-volt +/- 10 percent, 60 Hz. If a different voltage or closer regulation is required, a suitable regulator or transformer shall be provided.

b. Appropriate power supplies shall be furnished by the Contractor for all two (2) wire transmitters, loops for monitoring discrete inputs and all necessary outputs.

c. Power supplies shall be mounted in enclosures and installed in the appropriate indoor or field panel.

d. Power supplies shall be sized adequately for signal converter and repeater loads.

e. Design all power supplies for a minimum of 130 percent of the maximum simultaneous current draw.

f. A power on-off switch or an air circuit breaker shall be furnished for each item requiring electrical power.

g. Provide isolation transformers, line voltage regulators and power distribution panels for the distributed digital portions of the PMCS to eliminate electrical noise and/or transients entering on the primary power line.

2. Signal Requirements

a. The control system shall be designed to use 4 to 20 mA DC analog signals, unless otherwise specified.

b. Signal converters and repeaters shall be provided where required and in addition analog inputs to the distributed control system shall be through appropriate repeaters to provide signal isolation where series looped with other devices and to allow the loop to maintain integrity even if the distributed control system is out of service.

c. Signals shall be isolated from ground.

d. Signals shall not have a transient dc voltage exceeding 300 volts over one millisecond nor a dc component over 300 volts.

e. Equipment ranges, scales and set-point values specified in Division 40 and as shown on the P&IDs are for initial setting and configuration. Contractor shall coordinate these values with actual

equipment furnished to implement proper and stable process action as systems are placed in operation.

f. For any items where ranges, scales and set-points may not have been specified, Contractor shall submit a recommendation to the Engineer for review and approval.

g. Design all logic and control loops for fail-safe operation.

h. Surge protection shall be provided for all PMCS and all other control system components which could be damaged by electrical surges.

i. The system and associated input/output wiring will be used in a dam environment where there can be high energy ac fields, dc control pulses, and varying ground potentials between the sensors/transducers or input contact locations and the system components. The system design shall be adequate to provide proper protection against interference from all such possible situations.

B. Miscellaneous:

1. All PSMCS components shall be heavy-duty types, designed for continuous service in a dam environment.

2. All equipment provided are to be of Modular construction and to be capable of field expansion through the installation of plug-in circuit cards and additional cabinets as necessary.

3. All instrumentation and PMCS components shall be designed to return automatically to accurate measurement within 15 seconds upon restoration of power after a power failure or when transferred to standby power supply.

4. All field-mounted instruments and system components shall be designed for installation in humid and corrosive service conditions.

5. All field mounted cabinets, instrument enclosures, junction boxes and appurtenances shall conform to NEMA 4X requirements and be made of 12 gage 316 stainless steel, unless otherwise specified.

6. All relays with interconnections to field devices shall be wired through terminal blocks. Terminals as part of the relay base are not an acceptable alternate.

7. All panel mounted instruments, switches, and other devices shall be selected and arranged to present a pleasing coordinated appearance. All panel door mounted devices shall be of the same manufacturer and model line.

8. All components furnished, including field and rear of panel instruments, shall be tagged with the item number and nomenclature indicated on the Contract Documents and/or approved Shop Drawings.

9. Field-mounted devices shall be treated with an anti-fungus spray.

10. Field-mounted devices shall be protected from exposure to freezing temperatures.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Control Strategies

1. Functional descriptions of all monitoring and control sequences for the PMCS shall be as specified in Section 40 61 96 - PMCS Control Strategies.

2. The general guidance on how the control strategies shall be implemented in the PMCS shall be as specified in Section 40 61 95 – PMCS Monitoring and Control Criteria.

B. HMIs

1. HMIs and other display panels used for the monitoring and control of Unit Processes and equipment shall be as specified in Section 40 62 63 - PMCS Operator Interface Terminals.

C. PLCs

1. Programmable Logic Controllers for the PMCS shall be as specified in Section 40 63 43 - PMCS Programmable Logic Controllers.

D. Panels and Enclosures

1. Panels and Enclosure for the PMCS shall be as specified in Section 40 67 16 - PMCS Panels and Enclosures.

E. Panel Mounted and Field Instruments

1. Instruments and Devices installed on panels and in the field for the PMCS shall be as specified in Section 40 78 90 - PMCS Panel Mounted Instruments and Devices.

2. Standalone instruments and devices for the PMCS shall be as specified in Section 40 79 91 - PMCS Field Instruments

F. Lists and Index

1. PMCS I/O shall be as specified in Section 40 61 93 – PMCS Input Output List

2. The list of instruments, their ranges, Tag Numbers, and P&ID shall be as specified in Section 40 61 94 – PMCS Instrument Index.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Factory Tests

1. Factory testing for the PMCS shall be as specified in Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing for the PMCS shall be as specified in Section 40 80 82 – PMCS Startup and Field Testing

B. Training

1. Training on the operation and Maintenance of the PMCS shall be as specified in Section 40 61 26 – PMCS Training.

3.04 STARTUP / DEMONSTRATION

A. Operational Availability

1. The system test and Operational availability of the PMCS shall be as specified in Section 40 80 82 – PMCS Startup and Field Testing.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 61 26 – PMCS TRAINING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and coordinate all required training at times acceptable to the City and the Engineer.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Implementation	5
3.03	Field Testing / Quality Control	5
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 75 10 - Preliminary and Final Field Tess

B. Section 01 79 05 - Equipment Startup and Training

C. Section 40 61 13 - PMCS General Requirements

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to the PMCS.

1.05 DESCRIPTION

A. General

1. The Contractor shall retain the services of the PMCS Supplier to provide and perform standardized, structured training courses on site and off site, as specified in this Section, and the Specifications covering both operation and maintenance of the PMCS equipment.

2. On-Site Training

a. On-site training shall be at the dam where the PMCS will be installed.

b. On-site training shall make extensive use of the installed PMCS to ensure dam personnel develop an enhanced understanding and level of comfort with the PMCS.

c. On-site training submittals which in the opinion of the Engineer does not meet the objectives stated in this Section and the Specifications shall be rejected.

3. Off-site Training

a. Off-site training shall be conducted at an approved facility within a 10-mile radius of the Contract site.

b. The training facility shall be staffed with regular full-time training instructors.

c. If the PMCS Supplier does not have a training facility with a ten-mile radius of the Contract Site a suitable facility shall be rented.

d. Off-site training submittals which in the opinion of the Engineer does not meet the objectives stated in this Section and the Specifications shall be rejected.

4. All training, except Follow-up Training specified in this Section, shall be scheduled so that it is completed prior to Acceptance of the PMCS by the City.

5. The City will send the following personnel to attend training courses:

a. Operations Training – 4 persons

b. Maintenance Training - 4 persons

c. Supervisor Training - 2 persons

d. Engineer Training - 2 persons

6. All training shall be conducted during the hours of 8:00 AM to 12:00 AM until the conclusion of the training course.

7. All training sessions shall be provided twice and shall be scheduled by the City to accommodate their shift schedule.

1.06 QUALITY ASSURANCE

A. General:

1. For equipment items not manufactured by the PMCS Supplier, the PMCS Supplier shall provide for training by an authorized representative of the equipment manufacturer as part of PMCS Supplier services.

2. The manufacturer’s representative shall be fully knowledgeable in the operation and maintenance of the equipment.

B. PMCS Supplier's Training Qualifications

1. Section 40 61 13 – PMCS General Requirements specifies the PMCS Supplier’s training qualifications.

C. PMCS Supplier's Training Responsibility:

1. Section 40 61 13 – PMCS General Requirements specifies the PMCS Supplier’s training responsibility.

D. PMCS Supplier Training Personnel

1. The Contractor shall require the System Supplier to provide the following training personnel:

a. Lead Trainer

1) The System Supplier shall appoint a Lead Trainer who shall coordinate, schedule and conduct all work and assure that the Training schedule is met.

2) The Lead Trainer shall have a minimum of ten (10) years’ experience in coordination, scheduling and delivery of instrumentation and control training at/under similar Dam Facilities as this Contract including a thorough working knowledge of training administration as both a prime and sub-prime Vendor/Contractor.

3) The Lead Trainer shall be the PMCS Supplier’s liaison with the Contractor for all PMCS training requirements and shall assist in all matters required for proper coordination and interfacing of the training with the City.

1.07 SUBMITTALS

A. Shop Drawings General

1. Within 90 days of the effective Notice to Proceed, the Contractor shall submit for approval of the Engineer, Shop Drawings detailing the proposed plan for training, including but not limited to all course outlines and schedules.

2. Shop Drawing preparation shall not commence until after the pre-submittal specified in Section 40 61 13 – PMCS General Requirements.

3. Shop Drawings shall be submitted in complete packages grouped to permit review of related items as generally outlined in this Section.

B. Reports:

1. Training reports shall be submitted to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The PMCS training equipment and materials shall be delivered, stored and handled in accordance with this Section, the Specifications, the PMCS Supplier's recommendations and the following:

1. PMCS training equipment and material shall be packaged to protect each item from damage during shipment and storage.

2. Containers shall be protected against impact, abrasion, corrosion, discoloration and/or other damages.

3. Clearly label contents of each container and provide information on the required storage conditions necessary for the equipment and materials.

4. PMCS training equipment and materials shall be inspected for shipping damage or loose parts when received.

5. Evidence of water which may have entered equipment during transit shall be checked.

6. PMCS training equipment and materials shall be stored in a clean dry location in which a uniform temperature is maintained.

7. PMCS training equipment and materials shall be protected in storage with suitable covering and air circulation maintained to ensure the equipment and materials are kept dry and free from condensation.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Training shall be as delivered by the approved PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Training of Dam Personnel

1. Operator Training

a. Provide a 1-day course covering the structure and the functions of the PMCS, its components and devices.

b. The course shall familiarize the Operator with the procedures for applying the PMCS to process control situations or scenarios and develop operator issue resolution capability.

c. As a minimum, the course shall cover the following topics:

1) Overview of PMCS functional capabilities.

2) Equipment overview including PMCS component functions, operating principles and proper use.

3) Loading and start-up of the digital system hardware components.

4) Use of PMCS commands.

5) Development and use of system displays.

6) Use of bulk storage device for system backup.

2. Maintenance Training Course:

   a. Provide 1-day course covering preventive and troubleshooting maintenance for the PMCS components.

   b. The course shall familiarize the maintenance personnel with diagnostic capabilities of the system, both software and hardware, and also the routine maintenance procedures on the system and the common peripheral devices.

   c. As a minimum the course shall cover the following topics:

      1) PMCS overview description including the power subsystems and logic components of the processor bus.

      2) Description of the maintenance and troubleshooting aids of the system including software diagnostic programs.

      3) Description of all bus operations.

      4) Description of peripheral and process interface devices.

      5) The use of hardware diagnostic routines, test equipment and test procedures as required to enable the City's personnel to detect and isolate system faults to the circuit board or module level and to implement repairs by replacing failed circuit boards or modules.

3. Supervisor/Engineer Training

   a. Provide a 1-day manufacturer's standard training in the use and configuration of the PMCS HMI software.

   b. An instructor certified by the software manufacturer to furnish such training shall perform this training.

   c. The course shall be structured as follows:

      1) Fundamentals

         a) One one-day course (minimum) shall be provided which shall serve as a PMCS familiarization course for project management personnel, engineers, and key operating/maintenance personnel.

         b) This course shall be a prerequisite for the advanced course.

      2) Advanced

         a) One one-day (minimum) PMCS configuration and operating course shall be provided.

         b) The level of training shall be sufficient to familiarize the City personnel with the configuration and application of all PMCS programs.

c) All essential system operating procedures shall be described as required to enable the City personnel to operate and configure the PMCS via all interfaces such as Work Stations, Large Display Screens and local control panels.

d. Upon completion of the training the City personnel shall be able to make modification to Control Strategies and have them run in the PMCS.

e. Training shall be provided in the following subjects:

1) System overview and capabilities

2) Graphic display configuration, including linking of data to displays

3) Historical data configuration (collection, manipulation, and display)

4) Real-time and historical trending

5) Report configuration, generation, printing, and customization

6) System security

7) I/O driver and configuration

8) System back-up and recovery

9) Trouble-shooting

10) System optimization

11) System start-up and shutdown procedures

12) LAN and WAN communications, as appropriate

B. Follow-up Training

1. The PMCS Supplier shall provide operation and maintenance training covering all PMCS equipment provided.

2. The Follow-up Training shall take place 3 months after Acceptance of the PMCS by the City.

3. The Follow-up Training shall repeat the On-Site Training specified in this Section.

4. The Follow-up Training shall in addition, target those areas of PMCS equipment where Dam personnel have highlighted either operational or maintenance issues.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 61 93 – INPUT/OUTPUT LIST
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the I/O point list and requirements for configuring the PMCS databases.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Application	5
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

C. The I/O List information is provided in Table 1, attached after the End of Section designation.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

1.04 REFERENCES

A. Definitions

1. I/O – Input/Output
2. SFT – Start-up and Field Testing.
3. OAD – Operational Availability Demonstration.
4. URT – Upset and Recovery Testing.
5. WFAT - Witnessed Factory Acceptance Tests.
6. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. General

1. The I/O point list shall be used to configure the I/O interface hardware of all controllers of the PMCS.
2. The listing includes information on signal functions, signal ranges and range conversions.
3. As a minimum, the Contractor shall provide all hardware [and software] to provide the I/O points listed in the accompanying I/O List as indicated in the Contract documents and as required.
4. The Contractor shall furnish and install as spares, twenty-five (25) percent of each type of I/O of the listed I/O point hardware.
5. The Contractor shall furnish and install spare hardware and fully configure all spare points into the PMCS databases, displays, trends, alarms and controllers.
6. All I/O points designated as spares shall be completely prewired to equipment and panel terminal blocks such that only field connections need to be complete when the I/O is activated.

B. I/O List Column Headings

1. NO or Ref NO or Item NO – is a sequential number starting with a discrete number used to order the entries in the I/O List and permitting the list to sorted and resorted to its original order.
2. TAG NUMBER – is an alpha numeric character string used to identify the I/O point and laid out as follows PA_SS_EN_NO_ISA_###_Y where
   a. PA - is the process area.

b. [SS – is the sub process area, where required]

c. [EN – is the equipment type.]

d. NO – is the equipment number.

e. ISA – is the functional identifier of the I/O and follows ISA 5.1.

1) ISA identifiers will be provided with the I/O Lists.

f. ### - is a 3-digit number identifying the loop or field device.

g. Y – is a digit or letter identifying duplicate instruments or devices on the same loop.

3. I/O TYPE is a two letter describing the I/O as follows:

a. AI designates an analog input (4 to 20 mA DC)

b. AO designates an analog output (4 to 20 mA DC)

c. DI designates a discrete input

d. DO designates a momentary, maintained or latched discrete output.

4. SIGNAL TYPE is a description of the type of physical signal for the I/O point such as:

a. Contact (Dry contact input or output)

b. 4-20 mA

c. Soft I/O (Software communication between PLC's)

5. STATUS designates whether the I/O point is new or existing.

6. INSTRUMENT TYPE – is an alphanumeric string up 30 positions describing the signal attribute of the point such as:

a. Flow Indicating Transmitter

b. Limit Switch Open

c. Solenoid Valve

7. SERVICE – is an alphanumeric string up 30 positions describing the equipment where the signal is located.

8. REFERENCE DRAWING – is the listing of the Drawing where the I/O point can be found.

9. LOCATION – is the listing of the physical location of the instrument or device generating the I/O Point

10. RANGE – is the range of the of the I/O in engineering units.

11. REMARKS – can be used for supplementary information or to cross-reference information.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The Contractor shall not commence production of database until the configuration of all I/O points has been approved by the Engineer.

C. For each I/O attribute listed in the I/O list which cannot be used exactly as listed, submit an explanation of the reason for the deviation and propose a method to modify the I/O list information.

D. I/O information specific to all controllers shall in addition be submitted with the submittal covering that controller.

E. I/O Lists shall be kept current, updated regularly and shall be available for inspection by the City at the project site.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit all I/O lists and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of I/O listing submittal to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated I/O Listing of all device, instruments and I/O points.

E. Submittal shall be made at least [60] [90] days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS I/O Lists shall be implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Test shall conform to the requirements of Section 40 80 81 – PMCS Factory Tests.

B. Section 40 80 81 details how the configuration of I/O specified under this Section shall be verified against approved submittals.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. I/O Configuration

1. Implement the control system database fields in a consistent manner by using the following procedures:

a. Use abbreviations and acronyms already established in the Contract Documents.

b. In particular use the information in the I/O List.

c. Use only abbreviation or acronym for a word or group of words respectively.

d. Use the same subject and word order within data fields.

e. Use the same term (either phrase, word or acronym) to denote the same meaning.

f. Do not use multiple terms for a single meaning.

g. Use the point names, descriptions, logic state descriptions, ranges and units of measurement exactly wherever the point is referenced.

h. Show point names and descriptions for all point references on documentation.

i. Spell correctly.

j. Maintain lists of acronyms and abbreviations used.

B. I/O Hardware Configuration

1. Partition the I/O among cards within an I/O enclosure to provide control loop integrity.
    a. Put all inputs of the same I/O type associated with a device (e.g. pump, blower, clarifier or other piece of equipment) on the same card.
    b. Put all inputs of the same I/O type for devices arranged in process trains (e.g. a pump, its inlet valve and its outlet valve, or a pump and its associated macerator) on the same card or cards if more than one card is needed to accommodate the points.
    c. Put all outputs of the same I/O type associated with a device or group of devices in a process train on the same card.
    d. Where the preceding requirements specified in this subparagraph would cause more than 20 percent spare points on a card, points for a device or process train may be split between two consecutive cards.
    e. Make unused terminals resulting from partitioning the I/O into pre-wired spares.
    f. Provide pre-wired spare points with all cabling and termination internal to controllers as done for other I/O points.

C. Spares Utilization
1. If I/O is added by change order, incorporate pre-wired spare points into the active point data base at no increase in Contract price.
    a. Include changing point names, descriptions, ranges, or statuses from spare to the new point.
    b. Include adding points to group displays and summary displays.
    c. Include related documentation changes.
2. Spares utilization will be subject to the following limitations:
    a. The incorporation will not alter the control software configuration except to make the point accessible to displays, reports and future control software configuration.
    b. The incorporation will not alter the local area panels or field wiring to the device.
    c. Additions will not increase the size of reports or number of displays beyond that specified.
    d. The change will not be made subsequent to the controller shop drawing approval for a given process area.
3. Treat changing of active points to spare points in the same manner as incorporation of spares.

D. Point Data Fields

1. I/O point data fields will be subject to review and modification by the Engineer during the shop drawing review phase.

2. Incorporate changes directed by the Engineer completely into the entire system at no increase in Contract price subject to the following limitations:

3. Limit the total number of modifications to 20 percent of the total number of I/O points.

4. Each unique change will count as one modification. For example, modifying the description, range, and engineering unit on an analog input count as 3 modifications.

5. Analog input alarm limit definition will not be counted as a modification.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how the configuration of I/O specified under this Section shall be verified during Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the configuration of all PMCS I/O.

C. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Table 1 – I/O List

Ref NO	*Tag Number*	*I/O Type*	*Signal Type*	*Status*	*Instrument Type*	*Service*	*Reference Drawing*	*Location*	*Range*	*Remarks*
1	GIL_HLO_AAL_110	DI	Contact	Existing	Generator Control Panel	Generator Ready Signal	N/A	Generator		Re-use existing wiring terminated in Crest Gate PLC Cabinet.
2	GIL_HLO_AAL_111	DI	Contact	Existing	Generator Control Panel	Generator Low Fuel Signal	N/A	Generator		Re-use existing wiring terminated in Crest Gate PLC Cabinet.
3	GIL_HLO_AAL_112	DI	Contact	Existing	Generator Control Panel	Generator Emergency Fault Signal	N/A	Generator		Re-use existing wiring terminated in Crest Gate PLC Cabinet.
4	GIL_HLO_LT_351	DI	Contact (Pulse)	Existing	Tipping Bucket Precipitation Gauge	Local Rain Gauge	N/A	Parapet above Upper Gate Chamber	0.01" per pulse	Gauge to be relocated to a few feet down the parapet wall due to demolition activities. Provide new wiring to CP-HLO.
5	GIL_HLO_YYH_121	DO	Contact	Existing	Control Relay	Spillway Lighting Group 1 On/Off Command	N/A	Lighting Controller		Re-use existing wiring terminated in Crest Gate PLC Cabinet.
6	GIL_HLO_YYH_122	DO	Contact	Existing	Control Relay	Spillway Lighting Group 2 On/Off Command	N/A	Lighting Controller		Re-use existing wiring terminated in Crest Gate PLC Cabinet.
7	GIL_HLO_LIT_101	AI	4-20 mA	Existing	Level Transmitter	Upstream Stilling Well Level Transducer A	N/A	LIT-101	0- 50 ft H2O	Re-use existing wiring terminated in Crest Gate PLC Cabinet.
8	GIL_HLO_LIT_102	AI	4-20 mA	Existing	Level Transmitter	Upstream Stilling Well Level Transducer B	N/A	LIT-102	0- 50 ft H2O	Re-use existing wiring terminated in Crest Gate PLC Cabinet.
9	GIL_HLO_TT_334	AI	4-20 mA	Existing	Temperature Transmitter	Outside Ambient Air Temperature Sensor	N/A	TT-334	-22 to 167 °F	Existing conduits to be rerouted due to demolition activities. Provide new wiring from sensor to CP-HLO.
10	GIL_HLO_NT_342	AI	4-20 mA	Existing	Humidity Transmitter	Outside Ambient Air Relative Humidity Sensor	N/A	NT-342	0-100%	Existing conduits to be rerouted due to demolition activities. Provide new wiring from sensor to CP-HLO.
11	GIL_HLO_TT_338	AI	4-20 mA	New	Temperature Transmitter	CP-HLO Enclosure Temperature Sensor	N/A	TT-338	0 - 135 °F	
12	GIL_HLO_LT_401	AI	Soft I/O	New	Piezometer	Spillway Plunge Pool Level	475-I-004	CP-3/4	TBD	
13	GIL_HLO_FIT_133	AI	4-20 mA	New	Ultrasonic Insertion Flow Meter	High Level Outlet Flow	475-C-111	FIT-133	TBD	
14	GIL_HLO_LSH_191	DI	Contact	New	Float Switch	High Level Outlet Valve Chamber Flood Switch	475-I-004	LSH-191		Mounted 1" above finished floor
15	GIL_HLO_HS_131_A	DI	Contact	New	Control Relay	Isolating BKGV Control from Valve Actuator	475-I-006	CP-HLO		
16	GIL_HLO_HS_131_B	DI	Contact	New	Control Relay	Isolating BKGV Control from Manual Controls	475-I-006	CP-HLO		
17	GIL_HLO_HS_131_C	DI	Contact	New	Control Relay	Isolating BKGV Control from PLC	475-I-006	CP-HLO		
18	GIL_HLO_ZSH_131	DI	Contact	New	Control Relay	Isolating BKGV Fully Opened	475-I-006	CP-HLO		
19	GIL_HLO_ZSL_131	DI	Contact	New	Control Relay	Isolating BKGV Fully Closed	475-I-006	CP-HLO		
20	GIL_HLO_XS_131	DI	Contact	New	Control Relay	Isolating BKGV Actuator Fault	475-I-006	CP-HLO		
21	GIL_HLO_YYH_131	DO	Contact	New	Control Relay	Isolating BKGV Open Command	475-I-006	CP-HLO		
22	GIL_HLO_YYL_131	DO	Contact	New	Control Relay	Isolating BKGV Close Command	475-I-006	CP-HLO		
23	GIL_HLO_HS_132_A	DI	Contact	New	Control Relay	Control BKGV Control from Valve Actuator	475-I-006	CP-HLO		
24	GIL_HLO_HS_132_B	DI	Contact	New	Control Relay	Control BKGV Control from Manual Controls	475-I-006	CP-HLO		
25	GIL_HLO_HS_132_C	DI	Contact	New	Control Relay	Control BKGV Control from PLC	475-I-006	CP-HLO		
26	GIL_HLO_ZSH_132	DI	Contact	New	Control Relay	Control BKGV Fully Opened	475-I-006	CP-HLO		
27	GIL_HLO_ZSL_132	DI	Contact	New	Control Relay	Control BKGV Fully Closed	475-I-006	CP-HLO		
28	GIL_HLO_XS_132	DI	Contact	New	Control Relay	Control BKGV Actuator Fault	475-I-006	CP-HLO		
29	GIL_HLO_ZT_132	AI	4-20 mA	New	Valve Actuator	Control BKGV Position Feedback	N/A	Valve Actuator	0-100%	
30	GIL_HLO_ZC_132	AO	4-20 mA	New	Valve Actuator	Control BKGV Position Command	N/A	Valve Actuator	0-100%	
31	GIL_HLO_JS_001	DI	Contact	New	Control Relay	CP-HLO Power Available	475-I-006	CP-HLO		
32	GIL_HLO_JS_002	DI	Contact	New	Surge Protector	CP-HLO Surge Protector Fault	475-I-006	CP-HLO		
33	GIL_HLO_JS_003	DI	Contact	New	UPS	CP-HLO UPS Failure Alarm	475-I-006	CP-HLO		
34	GIL_HLO_JS_004	DI	Contact	New	UPS	CP-HLO UPS Loss of AC Power Alarm	475-I-006	CP-HLO		
35	GIL_HLO_JS_005	DI	Contact	New	Power Supply	CP-HLO Power Suppy 1 Failure Alarm	475-I-006	CP-HLO		
36	GIL_HLO_JS_006	DI	Contact	New	Power Supply	CP-HLO Power Suppy 2 Failure Alarm	475-I-006	CP-HLO		
37	GIL_HLO_JS_007	DI	Contact	New	Redundancy Module	CP-HLO Diode Redundancy Module Failure Alarm	475-I-006	CP-HLO		
38	GIL_HLO_XS_001	DI	Contact	New	Instrusion Switch	CP-HLO Tamper	N/A	CP-HLO		
39	GIL_HLO_XS_002	DI	Contact	New	Control Relay	Unauthorized Entry	N/A	CP-HLO		Signal from Security Panel
40	GIL_HLO_XS_003	DI	Contact	New	Control Relay	Authorized Entry	N/A	CP-HLO		Signal from Security Panel

SECTION 40 61 94 – PMCS INSTRUMENT INDEX
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section provides a listing of the minimum field and panel Instruments to be provided by the Contractor.

B. Additional Instruments may be required based on the actual equipment provided by the Contractor, and these additional Instruments shall be provided at no additional cost to the City.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Application	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

D. The Instrument Index is provided in Table 1, attached after the End of Section designation.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

B. Section 40 67 16 – PMCS Panel Mounted Instruments and Devices

C. Section 40 79 91 – PMCS Field Instruments

1.04 REFERENCES

A. Definitions

1. I/O – Input/Output
2. SFT – Start-up and Field Testing.
3. OAD – Operational Availability Demonstration.
4. URT – Upset and Recovery Testing.
5. WFAT - Witnessed Factory Acceptance Tests.
6. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. Field and Panel Instruments:

1. As a minimum, the Contractor shall furnish and install all field and panel instruments indicated in the accompanying Instrument Index.
2. The Contractor shall review the Instrumentation, Mechanical and Electrical drawings and individual equipment specifications for additional requirements.
3. Individual control and indicating devices such as selector switches, pushbuttons and indicating lights are not included in the Instrument Index and must be accounted for from the drawings, control sequence descriptions and individual equipment specifications.
4. The listing includes information on signal functions, signal ranges and range conversions and set points.
5. As a minimum, the Contractor shall provide all hardware to provide the Instruments in the accompanying Index as indicated in the Contract documents and as required.

B. Instrument Index Column Headings

1. NO or Ref NO or Item NO – is a sequential number starting with a discrete number used to order the entries in the Index and permitting the Index to sorted and resorted to its original order.

2. TAG NUMBER – is an alpha numeric character string used to identify the instrument function and is defined in Section 40 61 83 – Input/Output Lists.
3. INSTRUMENT TYPE – is an alphanumeric string up 30 positions describing the kind of Instrument such as:
    a. Float Assembly
    b. Pressure Gauge
    c. Level Transmitter
    d. Chart Recorder
    e. pH Sensor
4. SERVICE – is an alphanumeric string up 30 positions describing the process function the Instrument is used for.
5. LOCATION – is the listing of the physical location of the instrument.
6. DWG NUMBR – is the listing of the Drawing where the Instrument can be found.
7. RANGE – is the monitoring range of the Instrument in engineering units.
8. SET POINT – is the setting in engineering units at which Instrument will initiate an action in the PMCS or equipment control or just provide an alarm indication.
9. REMARKS – can be used for supplementary information or to cross-reference information.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. For each Instrument listed in the Instrument Index which cannot be used exactly as listed, submit an explanation of the reason for the deviation and propose a method to modify the Instrument Index information.

C. Information specific to all Instruments shall in addition be submitted with the submittal covering that Instrument.

D. Instrumentation Index shall be kept current, updated regularly and shall be available for inspection by the City at the project site.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit Instrument Index and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of Instrument Index submittals to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated Instrument Index of all instruments.

E. Submittal shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Instrument Index shall be implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Test shall conform to the requirements of Section 40 80 81 – PMCS Factory Tests.

B. Section 40 80 81 details how the Instruments specified under this Section shall be verified against approved submittals.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how the Instruments specified under this Section shall be verified during Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct functioning of all Instruments.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

40 61 94 TABLE 1
INSTRUMENT LIST

Ref NO	*Tag Number*	*Instrument Type*	*Service*	*Location*	*Dwg Nmbr*	*Range*	*Setpoint*	*Remarks*
1	GIL_SPW_LT_401	Piezometer	Spillway Plunge Pool Level	Spillway Plunge Pool	475-C-005	TBD	N/A	Used to calculate flow in PLC.
2	GIL_HLO_FIT_133	Insertion Flow Meter	High Level Outlet Flow	High Level Release Pipe	475-C-111	TBD	N/A	Multiple sensors connected to a single transmitter, producing one flow reading.
3	GIL_HLO_LSH_191	Float Switch	High Level Outlet Valve Chamber Flood Switch	High Level Outlet Valve Chamber	475-C-111	N/A	1" above finished floor	Used to send alarm to SCADA
4	GIL_HLO_LSHH_192	Float Switch	High Level Outlet Valve Chamber Lighting Protection Flood Switch	High Level Outlet Valve Chamber	475-C-111	N/A	1 ft below lowest light fixture	Wired directly to lighting circuit breaker trip coil.

VIBRATING WIRE PIEZOMETER

Project Name: CAT-475 Gilboa Dam HLO Installation

Project No.: 073358 **Spec No.:** 40 61 94.223

Sheet 1 of 1

Rev. No. 0

Category	No.	Item	Description
Device	1	Tag No./Range	See Schedule
Cable	2	Conductors	4 conductor, 2 twisted pair, all conductors use 7x30 22awg
	3	Conductor Insulation	10-mil high density polypropylene
	4	Cable Jacket	Blue PVC
	5	Nominal O.D.	6.35mm ± 0.25mm
	6	Temp. Range	-20°C to +80°C
	7	Acceptable Manufacturers	Geokon
	8	Model #	02-250V6
Transducer	9	Standard ranges	70 kPa
	10	Resolution	0.025% F.S.
	11	Accuracy	± 0.1% F.S.
	12	Linearity	< 0.5% F.S.
	13	Temperature	- 20°C to 80°C
	14	Thermal Zero Drift	± 0.1% F.S. /°C
	15	Diaphragm Displacement	<0.001cm³ @ F.S.
	16	Length & Diameter	133 x 25.4 mm
	17	Electrical Cable	4 conductor, polyurethane Jacket – integral to instrument
	18	Acceptable Manufacturers	Geokon
	19	Model #	4500AL-70kPa
Freeze Plug For 4500S (only)	20	Filter Material	Compressible Rubber Disc
	21	Acceptable Manufacturers	Geokon
	22	Model #	A4500-229-2
Miscellaneous	23	Spare Parts	One vibrating wire piezometer, as specified, of each type and range supplied.

Notes:

1. Install as shown on drawings and per manufacturer's recommendations.
2. Get instrument cable with pre-marked levels.
3. Cables will be pre-labeled.
4. All dimensions for instrument cable must be confirmed in field.
5. Orient sensor according to manufacturer's instructions.
6. Provide Geokon LAB3 surge protection device with enclosure for all Vibrating Wire Level Piezometers.
7. Provide sensor cables per manufacturer's instructions.
8. Provide all mounting appurtenances as required to install the instrument and make fully functional.
9. Install Freeze Plug on Piezometer at Tail Water location.

ULTRASONIC PIPE FLOW TRANSMITTER

Sheet 1 of 1

Project Name: CAT-475 Gilboa Dam HLO Installation

Project No.: 073358 **Spec No.:** 40 61 94.225 **Rev. No.** 0

Category	No.	Item	Description		
General	1	Tag No./Range	See Schedule		
	2	Ambient Temperature	-20 to 60 degrees C		
	3	Type	Insertion probe, exterior mount		
	4	Accuracy	+/- 0.15% of measured value		
Sensor	5	Mounting	Stainless Steel Hardware, twenty (20) insertion probe sensors, one (1) hydrostatic pressure sensor, with mounting rail assembly.		
	6	Orientation	Horizontal exterior of pipe, Mounted on opposite sides for 1 traverse		
	7	Protection	Weatherproof, Submersible, NEMA 6P		
	8	Material	Stainless Steel		
	9	Frequency	1 MHz		
	10	Miscellaneous	Suitable for Cement lining pipe. See notes		
Transmitter	11	Enclosure	IP66 NEMA 4X, Aluminum w/clear cover, Wall Mount		
	12	Conduit Connection	¾" NPT to 2" NPT		
	13	Power Supply	120 VAC		
	14	Output	Two (2) 4-20 mA isolated output linear to flow		
	15	Contacts	(2) 5 Amp rated SPDT contacts on 120 VAC powered Transmitters		
	16	Local Adjustments	Integral Keypad Interface		
	17	Miscellaneous	Microprocessor controlled with totalizer		
	18	Local Indicator	Engineering Units, 4 lines each with 16 characters, Illuminated back light		
	19	Diagnostics	Advanced diagnostics software package to provide signal strength, received signal voltage and correlation over time, and the time of flight for the individual measurement paths.		
Miscellaneous	20	Spare Parts	One spare 120 VAC Flow Transmitter, one spare transducer, box of every size and type of fuse, and maintenance kit.		
	21	Acceptable manufacturers	GWF		
	22	Transmitter Model No.	Ductus		
	23	Transducer Model No.	FT-S		

Notes:

1. Contractor shall field verify all cable lengths prior to procurement.
2. Field verify all conditions prior to procurement including all parameters for pipe dimensions and materials.
3. Install as shown on drawings and according to the manufacturer's recommendations.
4. Provide manufacturer field support to verify field installation and tuning of all final parameters for proper operation.
5. Orient sensor according to manufacturer's instructions.
6. Provide sensor cables per manufacturer's instructions.
7. Pipe Parameters:
    a. Pipe Diameter: 30" (30.00" OD)
    b. Wall Thickness: X.XX inches (Class 50)
    c. Pipe Liner: Cement mortar lining
    d. Pipe Material: Carbon Steel
    e. Velocity range
        i. Min flow X.X mgd X.X ft/s
        ii. Avg flow X mgd X.X ft/s
        iii. Max flow X.X mgd X.X ft/s
    f. Nominal Pressure <XXpsi

FLOAT SWITCH

Project Name: CAT-475 Gilboa Dam HLO Installation

Project No.: 073358 **Spec No.:** 40 61 94.409

Sheet 1 of 1

Rev. No. 0

Category	No.	Item	Description
General	1	Tag No./Range	See Schedule
	2	Enclosure	Submersible
	3	Mounting	Vertical
	4	Circuit Voltage	120 VAC/24 VDC
	5	Conduit Connections	¼" NPT via Liquidtight cord Grip
	6	Connection Wires	22 Gauge Wire, 60 ft in length. See notes below.
Float	8	Type	Seamless Formed Float
	9	Stem Material	316 Stainless Steel
	10	Float material	Buna-N, 2" High, 1.25" Dia.
Electronic Unit	11	Type	Magnetic Reed Switch, N.O.
	12	Switch Rating	0.5 A at 120 VAC and 24 VDC
	13	Maximum Temperature	105° C
	14	Maximum Pressure	150 psi
Miscellaneous	15	Acceptable Manufacturer	Madison
	16	Model Number	M4600

Notes:

1. Install as per drawings and in accordance with manufacturer's recommended installation drawings and requirements.
2. Final probe mountings to be coordinated with shop drawings, field requirements and verification of as-built elevations.
3. Contact manufacturer to provide float switches with custom length lead wires. Float switches are to be installed in the valve chamber of the High Level Release Tower. Termination of float switch lead wires must occur in the room housing the valve actuators, approximately 40.5 feet above the floor of the valve chamber.

NO TEXT ON THIS PAGE

SECTION 40 61 95 – PMCS MONITORING AND CONTROL CRITERIA
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide the services of the PMCS Supplier , to develop, load, configure, test, document and place in satisfactory operation all software] associated with the PMCS and all its ancillary devices, as described herein, as required by other Sections, as indicated on the Contract Drawings and as necessary for the Contractor to provide a properly operating and integrated system.

B. The Contractor shall provide a uniform appearance, seamless integration between all PMCS equipment and simplification of operation and maintenance, for the software being used and developed for all operator interfaces throughout the Contract.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Application	5
3.03	Field Testing / Quality Control	17
3.04	Startup / Demonstration	17
3.05	Adjusting / Protection / Cleanup	17

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

B. Section 40 67 16 – PMCS Panel Mounted Instruments and Devices

C. Section 40 79 91 – PMCS Field Instruments

D. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. HMI – Human Machine Interface
2. I/O – Input/Output
3. SFT – Start-up and Field Testing.
4. OAD – Operational Availability Demonstration.
5. OIT – Operator Interface Terminal.
6. URT – Upset and Recovery Testing.
7. WFAT - Witnessed Factory Acceptance Tests.
8. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. PMCS Software Required

1. The software packages the Contractor will be required to install, customize, configure, and develop shall include, but shall not be limited to:
   a. Workstation(s) and OIT Operating Systems.
   b. Workstation(s), and OIT Networking Software.
   c. Workstation(s), and OIT Utility Programs (Virus scan, remote communication, etc.).
   d. PLC Ladder Logic Development and Documentation Software.
   e. PLC Ladder Logic Application Software.
   f. PLC Specialty Software and Programming Languages.
   g. PLC Controller Configuration Software.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall utilize System and Software engineers who have been factory trained and certified on the respective software packages, to perform all programming functions, develop control strategies, create graphic displays, customize applications, document all work and coordinate the software interface.

C. System and Software engineers shall be intimately familiar with the details of this dam, instrumentation and control in general and the Contract goals and requirements.

D. System and Software engineers shall have a minimum of 10 years' experience in the PMCS development work required under this Contract.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall submit, through the Contractor, the following information for approval prior to beginning of the actual work of developing software for this Contract:

1. Qualifications and certifications of system software engineers.
2. A listing of all proposed software packages indicating quantities and where they will be installed.
3. Preliminary ladder logic for all PLC(s) and general methods of implementing the various control strategies.
4. Preliminary database and I/O listing showing system tag names and references.
5. Preliminary screen display count with general system structure.
6. Preliminary screen display development, general display organization and common components.

C. The PMCS Supplier shall submit all completed items to the Engineer for review and approval. As a minimum, the items to be submitted shall include, but shall not be limited to:

1. PLC ladder logic with full documentation and annotation
2. Full Color copies of all unique Graphic display screens
3. Screen animation and control
4. Databases
5. Alarm and event log lists, formats and messages

D. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

B. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Monitoring and Control Criteria shall be implemented by the PMCS Supplier.

B. HMI and OIT visualization software shall be as manufactured by:

1. Wonderware, Lake Forest, CA;

2. Or approved equal.

C. PMCS software shall be as manufactured by:

1. Wonderware, Lake Forest, CA;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Testing shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS Monitoring and Control Criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. PMCS Software

1. A single software package that has been approved by the City shall be used for all workstations, HMIs and OITs in this Contract.

2. The Contractor shall receive from the City, the appropriate number and type of software packages as required by the scope of this Contract.

3. Once installed and operating and the Contract completed and accepted, all licenses, media, documentation and packaging shall be returned to the City.

4. It shall be the responsibility of the Contractor to maintain all items entrusted to him in excellent condition.

5. Any damaged items or items not returned, shall be replaced at the Contractor's expense.

6. For City furnished PMCS Software required by this Section, it shall be the responsibility of the PMCS Supplier to provide factory training for his personnel, to allow them to become intimately familiar with all aspects of the supplied software package. This cost shall be included in the bid price and shall be done at no additional cost to the City.

7. It shall also be the responsibility of the Contractor, through the services of the PMCS supplier to install, setup, configure and place in optimum working order all PMCS Software as well as all other software referenced in this Section and as required.

8. All software shall be installed and configured, with strict adherence to manufacturer’s recommendations and the requirements of this Section, on all workstations supplied under this Contract.

B. General Control Philosophy

1. In order for the Contractor to provide the most reliable and fault tolerant PMCS, the following approach to programming shall be implemented:

a. All control logic, loop control, critical alarming and I/O shall be done in the controller at the local level.

b. Local workstations and OITs shall contain the database for their attached controllers.

c. Remote controllers shall access needed data from the respective local controller via the PMCS network shown in the Contract Drawings.

d. Where the PMCS network is an Ethernet LAN the Contractor shall obtain designated non-routable IP addresses for this contract from DEP OIT.

e. Workstations and OITs shall send only valid data to the PLC where it shall be "latched in" until such time as new valid data is made available.

f. A failure of the workstation shall not prevent the PLC from continuing to function normally using the last valid data it received.

g. All workstations, OITs, controllers and network components, shall be monitored for failures by the redundancy of components and through the use of "watchdog timers" programmed into the software.

h. Failure of any component shall be alarmed and annunciated at the next level of control and the information shall be immediately made available on the network.

i. Workstations and OITs shall monitor and display all digital and analog data available on their local PLCs and all pertinent data available on the network.

j. Where possible, the software shall be configured to verify the validity of that data.

k. Data that is in disagreement or out of valid range shall be indicated as such through the extensive use of displays and alarms.

C. PLC Programming Conventions

1. General

a. All logic, sequencing, interlocking, safety and critical alarm and control, shall be implemented at the PLC local level in the respective PLC using ladder type logic.

1) Individual "rungs" shall be provided for each logic function.

2) Subroutines shall be used where repetitive logic is required.

3) Alarm logic shall not be performed in subroutines as they may not be active at all times.

b. Commands such as start, stop, open, close, operating mode, sequence selection, etc., that are sent from the remote workstation by operator initiative or response, shall be "pulsed" and "latched" into the PLC logic.

c. All analog loop control such as temperature, flow or level shall be performed at the local PLC level not in the workstation.

d. All calculations and logic necessary to keep an individual loop in operation, in the event of failure of, or loss of communication with the workstation, shall also be done in the local PLC.

e. Where possible, all data points both analog and digital associated with the PLC based loop controllers, shall be available to the operator at the workstation and fully displayed and adjustable.

f. The ladder program shall be so written that the operator, via a local or remote workstation/OIT, can select the mode in which each individual loop is to operate, i.e., manual/auto or local/remote setpoint.

g. The operator also be able to view and manually adjust all parameters such as setpoint, output, gain, integral, derivative, etc., from the workstation.

h. Once entered, the valid data shall remain stored in the PLC until such time as new valid data is received.

2. Program Structure

a. All programming shall be implemented using ladder logic style programming only.

b. Other styles of programming, where necessary, shall only be used with the prior written permission of the Engineer and only when the task cannot be performed using ladder type logic.

c. The program shall be written using a well-organized and well documented structured approach.

d. All common elements shall be grouped together as much as possible.

e. For example, all logic for a single piece of equipment such as start/stop, indication, fault and alarm logic shall be grouped together to allow a phased or sequential startup and trouble-shooting.

3. Safeties and Interlocks

a. Upon initial startup or a subsequent restart of the [controller] [PLC] programs shall be written as follows:

1) First initialize all logic and data

2) Second bring all equipment and controls to a safe and ready status as allowed by safety and interlock status.

3) Only when equipment is in the safe and ready status shall equipment be permitted to be started as indicated in the individual control strategies.

4) When all start permissives are satisfied, a “ready” status for each piece of affected equipment, shall be issued for display by the HMI.

b. Upon startup or restart of equipment and/or systems after a power failure, the program shall retain the status of all equipment prior to the interruption.

c. Upon restoration of stable power, with a suitable and adjustable time delay on each piece of equipment, the program shall check the status of all controlled equipment and systems for faults and/or safety trips and only then allow equipment to be started as indicated in the individual control strategies.

d. Items indicating a faulted or unsafe condition shall be immediately locked out and the appropriate alarms generated for display by the HMI.

e. Where at all possible, all preset values (for timers, counters, etc.) and variables shall be stored in register memory and shall be made available to the operator at the HMI for both display and adjustment.

D. PMCS Programming Conventions

1. General

a. The operator interface to the PMCS Software shall be through an organized system of graphic displays and tabular data displayed on the workstations, HMIs and OITs and interface units installed throughout the PMCS.

b. Graphic displays shall be based on schematic representations of the process.

c. While only one of each type of similar equipment may be detailed on the contract drawings, all equipment, instrumentation and devices shall be represented on graphic displays in the level of detail depicted for the one typical equipment, device or instrument shown.

d. Displays of process equipment and piping shall be neatly laid out so as to be uncluttered and easily interpreted.

e. PMCS shall be displayed on multiple screens to allow all equipment and data to be shown clearly.

f. Displays of process piping and vessels shall be color coded to match the colors listed in the process piping schedules and shall match painting color schemes.

g. Color coding shall allow the operators to easily identify, by color, what process is being viewed.

h. If no color has been assigned to a certain process, the Contractor shall notify the Engineer who shall assign one.

i. Extensive use of animation; color and appearance change and sound shall be employed within displays.

j. Log-on and Password protection shall be required for all functions other than viewing general displays.

k. The Engineer shall decide the operator access level for each function provided by the Contractor.

2. Display System Structure

a. Displays shall be generally organized into areas based on the process with which they are associated.

b. An area index screen shall be provided showing “links” which when picked, will access all other screens in that system.

c. A general plant-wide index screen, accessible from the area index screen, having links to access all other area index screens shall be provided.

d. If previously created, the plant-wide index screen and all associated software shall be updated under this Contract to reflect the additions and/or changes made as part of this Contract.

e. All changes and updates shall be made on a plant wide basis, updating all workstations in the plant with the latest screens and information.

f. All displays throughout the PMCS shall have certain common elements. These elements shall include but shall not be limited to the following:

1) There shall be a group of quick access “buttons” located at the top of each screen.

a) Each of these buttons shall be assigned to screen within an area and shall provide a link, which when picked, will display the assigned screens.

b) When there are no alarms present on a given screen, the button shall be blank and disabled.

c) When there is any unacknowledged alarm present on a screen, its assigned button shall flash the system name in amber.

d) These screen names shall be assigned by the Engineer.

e) When the alarm(s) has (have) been acknowledged but is(are) still present, the system name shall show steady amber on the button.

f) The relative position of these buttons shall not change from screen to screen within an area.

2) There shall be additional buttons provided at the bottom of each screen allowing access to frequently needed items as follows:

a) The first items shall be an alarm SILENCE button and an ACKNOWLEDGE button.

(1) The SILENCE button shall silence alarms generated on any screen from any screen.

(2) This button shall silence both workstation audio alarms and any audible devices in the field and control room.

(3) The ACKNOWLEDGE button shall only acknowledge alarms generated on that screen.

(4) All alarms and alarms not associated with a given screen, shall be acknowledged from the alarm history screen.

b) The second item shall be an ALARM HISTORY button.

(1) This button shall immediately bring up the alarm history tabular display screen with the most recent alarms on the top of the list.

c) The third common item shall be an INDEX button. This button shall immediately bring up on the display, the area index screen previously described.

d) The remaining bottom buttons shall be used to provide direct links to other screens associated with the current screen.

(1) Some of these associated screens will be defined later.

(2) When possible, buttons for links to a particular screen shall occupy the same relative position from screen to screen.

3. Equipment Control Location Status

a. Each process and piece of process equipment (pumps, grinders, blowers, fans, etc.) shall have selector switches to transfer control of the equipment from one control location to another control location.

b. The graphic representation for each unit shall have an adjacent text field indicating where the current control location is.

c. The text background shall read [“CONSOLE”] on a blue background when control is at the workstation and read [“FIELD”] as appropriate on a gray background when control is elsewhere.

4. Equipment Start/Stop Control

a. All equipment started and stopped by the PLC shall have an operator graphic display on one or more of the graphic display screens.

b. As indicated on the contract drawings, each piece of equipment shall have a specific method of starting and stopping inclusive of emergency stop or one or a combination of the following

1) Manual ON/OFF control

2) Manual START/STOP

3) Combination of HAND/OFF/AUTOMATIC.

c. Starting, stopping or changing operating mode of any equipment or system shall require double action followed by a confirming dialog box.

1) The operator shall “double click” on a predefined pick box within the desired equipment symbol causing a dialog box to appear.

2) The dialog box shall contain buttons for the different mode selections available to the operator for that piece of equipment or system.

3) An “OK” button shall also appear in the box which shall confirm the selection.

4) Once completed, a second dialog box shall appear to reconfirm the selection with dialog such as “DO YOU WISH TO PLACE PUMP 3 IN RUN MODE”.

5) The operator shall select a “YES” or “NO” button to confirm the selection.

6) All dialog boxes shall have a “CANCEL” button which shall leave the system unchanged.

5. Alarms

a. Provide eight (8) levels of alarming for each analog variable. There shall be high-high-high, high-high, high, deviation low, deviation high, low, low-low, low-low-low.

b. Annunciate alarm with horn provided in the HMI/s and display appropriate alarm.

c. Assign alarm to printer(s) for logging.

d. The software shall display alarm status via color change or blink in line, text, or fill attributes.

e. The software shall have both alarm summary and alarm history displays with configurable message text including: DATE, TIME, TAG NAME, ALARM EVENT, ALARM TYPE, VALUE, SETPOINT, SEVERITY.

f. The alarm summary and alarm history displays shall be configurable for color of alarm window, new alarms, ACK alarms, and RTN alarms.

g. Momentary alarms shall be reported by the software if the signal made a transition from the normal state to the alarm state and back to the normal state between the polling sequences of a remote unit.

h. Momentary normal states shall be reported by the software if the signal made a transition from the alarm state to the normal state and back to alarm state between the polling sequences of a remote unit.

i. Multiple alarm and multiple normal states shall be reported by the software if multiple transitions were made between polling sequences.

j. Alarms shall be able to be routed to screen, printer, and/or disk file.

6. Trending

a. Software shall allow the configuration of real time trend displays which update continuously as new values are acquired.

b. Real time trend display shall be in Variable versus Time format.

c. Real time trend display shall support scaling of both variable and time axes.

d. Real time trend display shall support a minimum 4 variables per graph.

e. Software shall allow any number of real time trend graphs per screen.

f. Software shall allow configuration of Real time trends and Historical trends on same screen.

g. Software shall allow configuration of trend graphs and other animation (bar charts, push buttons, etc.) on the same screen.

h. Real time trend shall support trending result of arithmetic and/or logical expressions involving Tag names by typing in the expression in the desired pen field.

i. The PMCS supplier shall develop and assign real time trends for all monitored system analog variables, and shall submit proposed trend

plot groupings as part of the system software documentation submittal.

7. Historical Data Management

   a. The PMCS shall contain a Historical Data Base Utility which provides for long term storage of data collected from remote processors or manually entered from the keyboard.

   b. The Historical data shall be collected from the real time database and from these samples.

   c. The Historical system shall be configurable to calculate the average, maximum, minimum, standard deviation and total values over sampled data time intervals configurable on a per point basis.

   d. The software shall allow for historical data to be manually entered from the keyboard to facilitate entry of lab data or other information to be used in generating historical plant performance calculations.

   e. Signal values from the Historical Data Base shall be available for graphic displays, reports and trending.

   f. The size of the Historical Data Base shall be limited only by available disk space which at minimum shall be capable of holding 6 months of data.

   g. The Historical Data Management software shall provide utility routines to archive data to long term storage devices on demand, or automatically based on a user configurable time schedule.

   h. The Historical Data Base shall be organized as a series of Time Classes, each of which stores sampled or calculated values over a specified time interval.

   i. Up to 63 time classes shall be configurable, and each time class shall accommodate over 13,000 values.

8. Reports

   a. Software shall support printing of any screen created by the PMCS Supplier, whether or not it is the current active screen used by the operator.

   b. Software shall allow screen prints based on demand (i.e. push button), event, time, or combination thereof.

   c. PMCS Supplier shall submit actual copies of suggested report layouts for review and approval in accordance with the requirements of this Section.

   d. The process report generation software shall provide the means to process, store, and print data for historical records.

e. Configuration shall be flexible so that contents of the reports can be easily modified.

f. As a minimum, the following data collection functions shall be provided for all analog variables:

1) Instantaneous value; value at the end of the data collection interval.

2) Average value over the time interval.

3) Totalization over the time interval.

4) Highest value over the time interval.

5) Lowest value over the time interval.

g. Equipment Run Times shall be monitored, calculated and reported for all major process equipment items in the system.

h. Report data developed shall include year-to-date and month-to-date run times and starts for each item.

i. As a maximum, report data shall be collected and stored at ten minute intervals.

j. Each log report page shall have the capability to contain information for ten log points as a minimum.

k. Periodic log reports shall be printed automatically at the end of the time period.

l. A calculation extension capability shall be provided to perform calculations on data that has been accumulated for report generation.

1) Calculations shall consist of addition, subtraction, multiplication, and division functions for calculations of such items as engineering unit changes, totalization values where measurement values are different, and performance indexes.

2) Provisions shall be made for a minimum of 200 calculation extensions.

m. All reports shall be free form, thereby printing all general information, headings and data in an established format at the time of generation.

1) Pre- printed sheets shall not be acceptable.

2) Each page of a report shall have printed the plant name, type of report, date and time the report was printed, and page numbers.

n. Software shall be provided for generation of special event, hourly, daily, monthly and annual reports.

1) Reports shall be generated using process input/output, event information, analog, digital, manual and/or computed point information from records in database.

9. Process Variable Indicators and Controllers

a. All instruments providing analog data whether real or calculated shall be graphically displayed on the screen in its relative position in the process or in tabular form as required.

b. Process indicators such as “PI”, “FI”, “TI”, “FIC”, “TIC”, etc., shall be provided with all of the following features.

1) Each “instrument” shall appear as a standard instrument “bubble” or “lollipop” containing the ISA instrument type designation.

2) The instrument tag number shall appear using the same format as the Contract Drawings.

3) When instruments of the same equipment number appear on the same screen, the loop number alone shall be sufficient provided there are no duplicate loop numbers and it is clear what equipment the instrument is associated with.

4) Adjacent to the instrument symbol, the current “real time” value of the variable, in engineering units, shall be displayed.

5) Next to this shall appear the appropriate units.

c. All analog values, whether real or calculated, shall have alarm points configured in the software.

1) Those of a critical nature or where used to control equipment shall have this performed in the local PLC while being set and monitored from a workstation.

2) While within the normal range, variables shall appear in black.

3) When the variable moves outside the normal range, the text shall flash in red and the bubble shall flash amber.

4) Once acknowledged, both will cease flashing and remain steady colors until the condition is corrected.

5) A signal out of range or containing invalid data shall cause the text to display question marks on a flashing red background.

d. The operator shall be able to “double click” the instrument symbol and cause a dialog box to appear.

1) This box shall contain the full tag number of the instrument, measured variable name (i.e. High Level Outlet Flow), calibrated range and current alarm points.

2) One button shall be provided in the box to edit the alarm setpoints.

3) A second button shall allow the operator to display a trend graph, on a partial screen, of the variable against a time base of minutes, or hours (selectable).

10. Accumulators

a. Provide HMI configuration for accumulations.

1) Include run time for each piece of equipment.

2) Include number of starts for each motor.

3) Include totalized values for all flows.

11. Security

a. System Protection from unauthorized access to the PMCS interfaces shall be provided by means of software and hardware interlocks.

b. Provide eight (8) levels of security.

c. Software interlocks shall provide a minimum of two levels of security, Operator and Process/System Engineer.

d. Operators shall only be permitted access to PMCS HMI software allowing only operating and configuration of equipment for operational actions only, such as start, stop, modes changes such as local and remote, placing multiple items of similar equipment in and out of service, generating trends, dealing with alarms and all actions required by Operators to maintain processes 24 hours a day, 365/366 days a year.

e. Only Process/System Engineers shall be allowed to exit the HMI software and access the operating system and other resident software applications for hardware and software operating system, controller/PLC programming and editing.

f. Program editing access shall require entry of a minimum eight character entry code assigned within the controller program.

g. All PMCS users shall be required to log on to the LAN network and PMCS Software interface with a predefined user name and password before access to operate or modify the system can be obtained.

h. All defined user names shall be associated with a set security level.

i. Each display shall be assigned a security level required to access it.

j. All signals and control functions shall have separately assignable security levels required for viewing functions signal value change functions to restrict control access where required or desired.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. PMCS Monitoring and Control Criteria specified under this Section shall be verified during PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct implementation of the PMCS Monitoring and Control Criteria specified under this Section.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 61 96 – PMCS CONTROL STRATEGIES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish Control Strategy diagrams, configuration sheets and Control Strategy descriptions as shop drawings for approval.

B. The Contractor shall perform all programming, configuration and tuning required to implement each Control Strategy listed in this Section.

C. The following index of this Section is presented for convenience:

Article	Title	Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	4
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	8
3.03	Field Testing / Quality Control	8
3.04	Startup / Demonstration	8
3.05	Adjusting / Protection / Cleanup	8

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 53 – Identification for Electrical Systems.

B. Section 26 29 13 – Enclosed Controllers.

C. Section 26 43 13 – Low-Voltage Surge Protective Devices

D. Section 40 61 13 – PMCS General Requirements.

1.04 REFERENCES

A. Definitions

1. CS - Control Strategy

2. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. The Control Strategies in this Section are written descriptions of the basic configuration and/or programming required to implement regulatory and sequential control of the unit processes as shown on the P&IDs.

B. The Control Strategies do not in all cases describe the process characteristics fully, many of which may only become apparent during shop drawing assembly or during start-up.

C. Control Strategies shall fully reside in the memory of the designated PLC.

D. The process inputs/outputs referred to in the Control Strategies are all shown on the I/O list in Section 40 61 93.

E. Any additional I/O (Maximum 20%) required shall be added during Shop Drawing Review and shall be provided at no additional cost to the City.

F. Process Control Functions

1. Process control function shall be structured to permit the realization of all Control Strategy requirements.

2. Each control function shall be designed so that bumpless, balance free transfers are obtained during operating mode changeover and/or initialization.

3. Where applicable, user-changeable parameters shall be automatically defaulted to a preset value if a specific value is not given during system generation.

4. Provision shall be made to include certain control functions that apply to all analog inputs, virtual variables, analog controllers and discrete control whether or not shown on the Contract Drawings, even though one or more of the functions may be disabled by the user for a given data base point:

a. Analog Data Scaling

1) This control function shall scale all analog inputs to a common span and shall normalize the digital representation of each analog input to a percent of the operating span.

2) The processed value shall be expressed as a binary number that specifies the analog input's position on a straight line lying between zero and full scale as defined for a given input by the zero span values in the data base.

b. Amplitude Limit Check

1) This control function shall perform dual level, high/low amplitude limit checking and shall identify a limit violation every time a measured or virtual variable goes out-of-limits and returns back into limits.

2) The control function shall determine the time at which each limit excursion occurred.

3) A deadband shall be provided on each limit and shall be expressed as a percentage of span or in engineering units.

4) Low and high limiting default values will be set-up for each measured or calculated variables used in the process control loops.

c. Engineering Unit Conversion

1) This control function shall convert scaled analog data to engineering units by means of the following equation:

a) $Y = ((H - L) (D/DH) + L)$ where

Y is the value in engineering units.

H is the high value of span, expressed in engineering units

L is the low value of span, expressed in engineering units.

D is the digitized scaled input value in counts.

DH is the full scale digitized value in counts

d. Manual Control

1) It shall be possible for operator to interrupt any sequence, loop or automatic operation and operate the same manually through the operator workstation or local Operator Interface Terminal (OIT) located on the PLC control panel.

e. Verification of Digital Outputs

1) This control function shall verify that the equipment has responded to the digital commands before proceeding to next step during automatic operation.

2) If any discrepancy is detected, an alarm will be annunciated.

G. Hardware

1. The Contractor shall provide all the hardware, whether or not shown or specified that may be necessary to implement the Control Strategies as described in this Section or the Specifications.

H. Configuration

1. All set points, tuning parameters and engineering scales, etc., shall be documented for each control point and each control strategy on configuration sheets or similar documents.

2. These documents shall be updated during factory testing and finally during start-up.

I. Control Strategy Displays

1. Control Strategy displays shall be submitted for review.

2. Displays shall clearly show initial conditions, start, and progression of the control strategies.

3. Each Control Strategy shall be displayed in a minimum number of displays for ease of monitoring by the operator.

J. Power Failure

1. Dam equipment controlled by the PLC shall be programmed to automatically reset upon failure.

K. Restart

1. All equipment and motors shall be automatically restarted after power failure by the control system in an orderly fashion approved by the Engineer.

2. Final approval of the restart sequence shall be given by the Engineer during factory testing and start-up.

L. Position indication of Gates and Valve in transition.

1. Open pilot lights and indicators in/at all Control Stations and HMIs shall blink when a gate or valve is in the open transition and shall stay steady on when fully open.

2. Closed pilot lights and indicators in/at all Control Stations and HMIs shall blink when a gate or valve is in the closed transition and shall stay steady on when fully closed.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements.

1.07 SUBMITTALS

A. Control Strategies detailed in this Section shall be submitted for approval by the Engineer.

B. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Control Strategies shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Control Strategy CS-01

1. TITLE: High Level Outlet Bonneted Knife Gate Valves
2. DRAWING: 475-I-005
3. DESCRIPTION: Monitoring and Control of High Level Outlet Flow

a. There are two (2) Bonneted Gate Knife Valves (BKGVs) controlling high level outlet flow from the upstream pool to the spillway. The Isolating BKGV (V-131) operates in either the fully open position to allow flow through the high level outlet, or in the fully closed position to block flow. The Control BKGV (V-132) is a modulating valve used to control the flow through the high level outlet. Both valves are controlled by electric actuators.

b. An ultrasonic insertion-type flow meter (FIT-133) monitors the flow through the high level outlet.

c. Two (2) redundant level transmitters (LIT-101 and LIT-102) monitor the level of the upstream pool.

d. BKGV operations are typically initiated from either the High Level Outlet Control Panel (CP-HLO) in the Upper Gate Chamber or from a remote SCADA workstation. Operators may also control the valves at the valve actuators located in the High Level Release Tower.

e. Control logic for the BKGVs and associated instruments shall reside in the PLC in CP-HLO ("PLC-HLO").

4. INTERLOCKS AND ANNUNCIATION

a. Screens shall trip when any of the following alarms (all set-point and alarms shall be adjustable and displayed at the Main Control Station Operator Workstation) is active:

1) BKGV actuator fault

2) Upstream pool level high

5. FUNCITONAL DESCRIPTIONS

a. Local Manual Operation from the BKGV Actuator

1) Set the Local/Remote selector switch on the valve actuator to Local.

2) Use the Open/Stop/Close controls on the actuator to adjust the position of the valve

3) A pilot light on CP-HLO shall illuminate to indicate that the valve is being controlled from the actuator. Indication shall also be provided at the OIT and SCADA workstations.

b. Local Manual Operation from CP-HLO

1) Set the Local/Off/Remote selector switch to Local at CP-HLO.

2) Use the Open/Stop/Close selector switch on CP-HLO to adjust the position of the valve.

3) A pilot light on CP-HLO shall illuminate to indicate that the valve is being controlled manually with the hardwired controls. Indication shall also be provided at the OIT and SCADA workstations.

4) High level outlet flow (FIT-133) shall be indicated on a digital process meter on CP-HLO, on the local OIT, and at SCADA workstations.

5) The position of the Control BKGV (V-132) shall be indicated on a digital process meter on CP-HLO, on the local OIT, and at SCADA workstations.

6) Pilot lights on CP-HLO shall illuminate to indicate when either BKGV is fully open, fully closed, or has a fault condition. The same indications shall be provided on the local OIT and SCADA workstations.

c. Remote Manual Operation from CP-HLO or SCADA Workstation

1) Set the Local/Off/Remote selector switch to Remote at CP-HLO. Use the soft controls at the OIT on CP-HLO or in SCADA to select Manual Control.

2) Use the soft controls at the OIT on CP-HLO or in SCADA to adjust the position of the valve.

3) Soft controls for the Isolating BKGV (V-131) shall include maintained Open/Stop/Close pushbuttons and indications for Fully Open, Fully Closed, and Fault.

4) Soft controls for the Control BKGV (V-132) shall include an input field to command the valve to any position (0-100% Open), momentary Open/Close pushbuttons, a maintained Stop pushbutton, and indications for Percent Open, Fully Open, Fully Closed, and Fault.

5) A pilot light on CP-HLO shall illuminate to indicate that the valve is being controlled by PLC-HLO. Indication of Remote Manual Mode shall also be provided at the OIT and SCADA workstations.

d. Remote Auto Operation from CP-HLO or SCADA Workstation

1) This mode is not used for controlling the BKGVs.

e. Miscellaneous Monitoring Signals

1) High Level Outlet Valve Chamber Flood Switch

a) A float switch (LSH-191) will be installed in the High Level Outlet Valve Chamber 1” above the finished floor to detect if the valve chamber has flooded. The float switch will be wired to a digital input to PLC-HLO.

b) The PLC shall generate an alarm at the OIT on CP-HLO and in SCADA if this flood switch is activated to notify personnel of the issue.

c) A secondary flood switch will be installed in the High Level Outlet Valve Chamber just below the level of the lighting fixtures to shut off power to the lights in the event the water level in the chamber rises to that level. This flood switch will be wired directly to a relay that controls the lighting circuit and will not have any connection to the PLC or SCADA.

2) Plunge Pool Piezometer

a) A vibrating wire piezometer (LT-401) will be installed in the endsill of the spillway to monitor the level at the end of the spillway.

b) The piezometer will be wired to a multiplexer in existing CP-8 at the North Training Wall. The water level will be communicated over the fiber loop to PLC-HLO and displayed at the OIT in SCADA. Refer to System Architecture drawing on 475-I-004 for a full description of the communication pathway.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. Shop Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 63 43 – PMCS PROGRAMMABLE LOGIC CONTROLLERS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install, calibrate, test, startup, and place into satisfactory operation PMCS PLCs.

B. The PMCS Supplier shall provide on behalf of the Contractor all configuration and documentation of all PMCS PLCs.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	12
2.04	Source Quality Control / Shop Tests	12
PART 3	EXECUTION	13
3.01	Examination / Preparation	13
3.02	Implementation	13
3.03	Field Testing / Quality Control	14
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

B. Section 40 61 95 – PMCS Monitoring and Control Criteria.

C. Section 40 62 63 – PMCS Operator Interface Terminals

1.04 REFERENCES

A. Definitions

1.	Peer-to-Peer	-	Communication between devices connected to a common channel where each device can control the communication exchange.
2.	PID	–	Proportional, Integral and Derivative, a description of controller action which modifies the response to an input signal and a set point such that the output rapidly and optimally achieves the set point.
3.	PPU	–	Portable Programming Unit
4.	Section 40 61 13	–	PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1.	Section 40 61 13	–	PMCS General Requirements lists the standards applicable to this Section and the PMCS.
2.	IEEE 37.90.1	–	IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.
3.	NEMA ICS 61131-1	–	Programmable Controllers Part 1: General Information.
4.	NEMA ICS 61131-4	–	Programmable Controllers Part 4: User Guidelines.
5.	IEC 61131	–	Programmable Controllers

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of PLCs.

C. Manufacturers shall have produced PLCs for a minimum of 20 years.

D. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

E. All material furnished under this Contract shall be determined safe by either Underwriters Laboratories, Inc., or Factory Mutual Engineering Corporation and all material shall be labeled, certified, or listed by the testing agency.

F. Custom made equipment or related installation which are constructed specially for this Project will not be acceptable.

G. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

H. The PMCS Supplier shall utilize System and Software engineers who have been factory trained and certified on the respective software packages, to perform all programming functions, develop control strategies, create graphic displays, customize applications, document all work and coordinate the software interface.

I. System and Software engineers shall be intimately familiar with the details of this dam, instrumentation and control in general and the Contract goals and requirements.

J. System and Software engineers shall have a minimum of 10 years' experience in the PMCS development work required under this Contract.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall submit, through the Contractor, the following information for approval prior to beginning of the actual work of developing software for this Contract:

1. Qualifications and certifications of system software engineers.
2. A listing of all proposed software packages indicating quantities and where they will be installed.
3. Preliminary ladder logic for all PLC(s) and general methods of implementing the various control strategies.
4. Preliminary database and I/O listing showing system tag names and references.
5. Preliminary screen display count with general system structure.
6. Preliminary screen display development, general display organization and common components.

C. The PMCS Supplier shall submit all completed items to the Engineer for review and approval. As a minimum, the items to be submitted shall include, but shall not be limited to:

1. PLC ladder logic with full documentation and annotation
2. Full Color copies of all unique Graphic display screens
3. Screen animation and control
4. Databases
5. Alarm and event log lists, formats and messages

D. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall comply with spare parts, special tools and supplies listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Spare parts and tools shall be as recommended by the manufacturer and shall as a minimum include the following:

1. One (1) I/O modules for each type furnished.
2. One (1) communication modules (Ethernet, Remote I/O, PLC LAN) for each type furnished.
3. One (1) CPUs of each size and type furnished.
4. One (1) PLC rack of each type and size furnished.
5. One (1) power supplies of each size furnished.
6. One (1) PLC for each type furnished.
7. All spare parts recommended by manufacturer and listed as recommended spare parts in the manufacturer's submitted O&M Manual.
8. Tools
    a. Furnish all tools necessary to service, disassemble, repair, and adjust the equipment.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Programmable Logic Controllers shall be as manufactured by:

1. BWS

a. Schneider Electric, Andover, MA;

b. Allen Bradley, Milwaukee, WI.

c. Or approved equal.

B. PMCS PLC OITs/HMIs shall be as manufactured by:

1. Schneider Electric, Andover, MA;

2. Or approved equal.

C. PPUs shall be as manufactured by:

1. Azonix, Houston, TX;

2. Or approved equal.

D. Fiber connectors and accessories for PPUs shall be as manufactured by:

1. Stran Technologies, Houston, TX;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General

1. The PMCS PLCs shall implement and provide the Control Strategies specified in Section 40 61 96 – PMCS Control Strategies.

2. Where shown on the Contract Drawings redundant PLCs configured in hot standby arrangements shall be provided.

3. The PLC shall be configured by the Contractor to perform functions shown and specified. The Contractor shall coordinate and obtain from all equipment suppliers PLC systems of the same manufacturer and series.

4. Functions to be performed by the PLC include but are not necessarily limited to the following:

a. Alarm and status indication.

b. PID control and arithmetic functions.

c. Interlock and sequential logic control of processes and equipment operations.

d. Collection and transmission of data and control parameters to and from other PLCs.

e. Provide a dry contact rated 2 amperes at 120-volt a-c for remote indication of processor failure.

5. The PLC shall be microprocessor type furnished with all necessary relays, timers, counters, and latches as data manipulative functions and arranged into the format required to accomplish the functions shown and specified.

6. The PLC shall be designed and constructed for the demanding requirements of real-time process management and control on a continuous basis for use in a dam facility.

7. The manipulative functions shall have the capability of being rearranged into any desired format while the controller is performing other control tasks.

8. Expansion of the controller by the input/output points, internal data manipulative functions, and relays, timers and counters shall be accomplished by reprogramming.

9. The control programs and applications memory of the PLC shall be capable of being remotely (off-line) and locally (on-line) monitored, programmed, modified and displayed by use of a personal computer and documentation software which shall be provided as part of this Contract.

10. In addition, the PLC shall be capable of being programmed by an external PC compatible host device via an Ethernet communication port. The host communication interface shall allow controlled access for authorized users via password protection to all registers, I/O system fault status and I/O override.

11. The logic shall be entered and displayed in ladder diagram format.

12. The ladder diagram format shall contain a complete cross reference with each coil referred to in logic and identified as normally open or normally closed.

13. Mnemonic information shall be added to each coil and to both real and internal I/O points. Alphanumeric titles and descriptions shall appear on the screen.

14. Any restructuring of the control logic shall be done at the PLC installation and shall not necessitate any removal components of the PLC to another location.

15. The PLC construction shall be that of a modular type design.

16. All inputs, outputs, and logic control interface units shall be easily removed for ease in replacement or restructuring the hardware arrangement.

17. Shut down of the processor control logic (halting of program scan) shall not occur if I/O or Remote I/O modules are removed.

18. In the event of a power failure or malfunction of the logic hardware, the controller shall provide dry, Form C contact closures for remote and local indication and alarming.

19. A self-diagnostics package to determine proper processor operation shall be included. Diagnostic LED shall be provided in clear view on the front of the PLC enclosure.

20. Changing an on-line control logic process operation shall not necessitate the halting of the processor.

21. Burn-in for all printed circuit boards and modules shall be performed at the factory.

22. Programmable Logic Controllers shall conform to NEMA ICS 61131 – 1 and NEMA ICS 61131 – 4

23. The primary interface to the process equipment and field devices shall be provided by the input/output system consisting of I/O modules installed in the PLC backplane, chassis or remote mounting racks.

24. The input/output system hardware shall be designed with the following features:

    a. Noise immunity and filtering.

    b. IEEE surge-withstand rating to IEEE 37.90.1

    c. Optical isolation for all inputs and outputs to provide controller logic protection.

    d. No on board pots requiring adjustment or maintenance.

    e. Any card, any slot, plug-in packaging, with locking bars and/or screws to hold I/O modules in place.

    f. 600 volt, screw type, field wiring terminal strips sized to accommodate a minimum of two # 14 AWG wires per terminal within control panels and MCCs.

    g. Terminal strip design shall allow I/O module removal and replacement without disturbing wiring connections.

    h. Front-of-module LED status indicators for each individual I/O point to indicate when power is applied at I/O terminals.

    i. Individually fused output circuits for all output modules.

    j. Output fuses shall be capable of being inspected without removal of and replaced without disassembly of the output module.

    k. Individually isolated output modules shall be provided with front-of-module blown fuse LED status indicators for each output point.

    l. Non-isolated (common output power source) output modules shall be provided with common blown fuse LED status indicators for a maximum of every four points.

    m. All outputs for contactors and relays shall be rated for a minimum of 2.0 amps continuous at 120 VAC.

n. Where higher rated outputs are required interposing relays located inside control panels shall be provided in order to assure that ratings of the PLC output contacts are not exceeded.

o. For outputs to motor contactors and other equipment type load relays, provide transient and inrush surge suppressor connected across the output contact terminal and the neutral common terminal inside the control panel to suppress the switching surge transient to lower than the continuous rating of the output contacts.

p. The maximum number of points per I/O module shall be as follows:

1) Discrete: 16.

2) Analog: 8.

q. The following types of I/O modules shall be provided for use with the supplied PLC System:

1) Analog Inputs (12 bits minimum):

a) 0-10 VDC.

b) 1-5 VDC.

c) 4-20 mA DC (250 ohms maximum impedance).

d) Millivolt signals.

2) Analog Outputs (12 bits minimum):

a) 4-20 mA DC (load of750 ohms minimum).

b) 0-10 VDC.

c) 1-5 VDC.

3) Register Inputs and Outputs (16 bit):

a) Single BCD.

b) Multiplexed BCD.

4) Discrete Inputs:

a) 5 V, 12 V, 24 V, 48 V and 120 VAC/DC in both isolated and common circuit types.

b) TTL Logic.

5) Discrete Outputs:

a) 120 VAC in both isolated and common circuit types.

b) 12-120 VDC.

c) Form C Relay Contacts.

d) TTL Logic.

6) High Speed Encoder/Counter:

a) Accept and count pulse inputs independently and unaffected by I/O scan or program scan.

b) Minimum pulse rate of 50 kHz.

7) Remote I/O

a) Remote I/O shall be provided where shown on the Contract Drawings or the PMCS Block Diagrams or where recommended by the manufacturer to reduce the level and quantity physical wiring at the PLC location.

b) Remote I/O shall be either PLC rack type I/O or intelligent field modules, as manufactured by the PLC manufacturer.

c) Remote I/O processor or communication modules shall be modular and individually replaceable.

d) Remote I/O shall communicate with PLC CPU using the PLC manufacturer's communication bus for remote I/O.

e) All required cabling shall be furnished under this Contract for use in/with the conduit system as indicated on the Contract Drawings.

(1) Provide adequate lengths.

(2) Cabling will be installed under the Electrical Contract.

25. Signal and control circuitry to individual I/O boards shall be arranged such that a board failure shall not disable more than one half of the control loops within any group of controlled equipment (e.g., one pump out of a group of three pumps, two pumps out of four, etc.).

26. Where possible, individual control loops and equipment shall be assigned to individual boards such that failure of the board will disable only one loop or piece of equipment.

B. Required PLC Features:

1. Construction

a. Modular printed circuit boards.

2. Type

a. Electronic components with central processing unit and software reprogramming capabilities.

3. Memory

a. System Memory

1) Electrically Erasable Non-volatile type (EEPROM) or Lithium battery-backed RAM with minimum retention time of 2 years under worst case conditions.

b. Application Memory:

1) Type, Lithium Battery-backed RAM with minimum retention time of 2 years under worst case conditions, or RAM with EEPROM or NOVRAM backup modules.

2) Size, as required for present and dedicated future I/O capacity and for performance of the specified functional requirements plus 25 percent spare capacity as a minimum.

4. Language Format

a. Ladder type diagrams and functional blocks.

5. Provide type and quantity of I/O as required to perform the operational and functional requirements plus 20 percent spare (minimum of one module) for each type of I/O module used.

6. Spare I/O points shall be mounted and wired ready for use and shall require only field wiring connections and software configuration to place the point in service.

7. Internal Functions

a. Relays, timers, counters, latches, internal storage registers, and other functions as required to perform specified functional requirements plus 25 percent spare capacity.

8. Report Generation

a. Processor shall have the capability to store and automatically communicate up to 198 ASCII status/alarm/diagnostic type messages to a peripheral display device via the RS-232C output port at rates up to 19.2 K bits/second.

9. Security Features

a. Key switch interlock on PLC and/or security password protection through system programmer terminal to prevent tampering of logic sequences and unauthorized programming.

10. Processor Scan Time

a. 0.3 to 2 ms per kbytes of memory typical.

b. No more than one word shall be required for each contact or coil including address, no more than one word for a branch, no words for spaces or connects, and no words shall be required to begin a new rung.

c. Scan time refers to nominal memory scan time of words of relay ladder logic, with an "immediate I/O" command to operate on instantaneous alarm information.

d. Unprogrammed memory shall not be scanned.

11. Operating Temperature

a. 32 ^{0}F to 140 ^{0}F.

12. Storage Temperature

a. Minus 40 ^{0}F to 160 ^{0}F.

13. Power Supply

a. 120 VAC, with circuit breaker protection.

b. Supplies shall be sized for a minimum of 130 percent of maximum simultaneous current draw.

c. Comply with requirements specified in with Section 40 61 13 – PMCS General Requirements.

14. Data Communications

a. All PLCs shall be provided with Ethernet networking capability using Modbus TCP/IP protocol. All modules required shall be supplied.

15. Clock

a. Battery-backed clock with typical variation of ±20 sec. per month.

16. Programming/Documentation Software

a. Provide PLC programming/documentation software package which shall be fully menu-driven and self-prompting.

b. Package shall provide fully integrated ladder diagram programming and documentation.

c. The package shall allow 3 lines of mnemonics per ladder element with 6 characters per line minimum. The package shall also provide for the inclusion of the following documentation information for ladder diagram contacts and coils:

1) Panel I/O wiring list.

2) Rack number.

3) Module position slot number.

4) I/O module type.

5) Terminal number and wire number.

6) Electrical and Mechanical Drawing Reference Number.

7) Description of up to 240 characters in length for each element.

d. The programming/ documentation software displays shall allow the user to flip between documentation and the uncommented rung as it resides in the controller.

e. Software shall also allow selection of single rung and continuous ladder diagram printouts.

17. PLC Configuration

a. PLC types shall be as designated on the PMCS Block Diagram and this Section.

b. Memory and processor shall be adequate for all control functions specified.

18. PLC Minimum Performance Requirements

a. The table below lists the minimum requirements for various sizes of PLC.

PLC Type	Micro	Small	Mid-Size	Large
I/O Discrete Points	14	960	4096	12000
I/O Analog Points	3	96	2048	8000
Memory	3 kB	6 kB	96 kB	440 kB
Scan time	3 ms/kB	2.5 ms/kB	0.3 ms/kB	0.3 ms/k

19. PLC OITs/HMIs

a. OITs/HMIs shall comply with Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 62 63 – PMCS Operator Interface Terminals.

20. MCC I/O Sections

a. Not used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS PLCs shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS PLC monitoring and control criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

C. Refer to section 40 80 81 PMCS Factory Testing for specific factory test requirements for PMCS PLCs.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Install each item in accordance with manufacturers recommendations and in accordance with the Contract Documents.

B. Configure PLC to prevent erroneous and nuisance alarms by using techniques including time delays and logic such as

1. Inhibit initiation of a seal water failure alarm when pump is not running

2. Provide a time delay on high discharge pressure alarm.

C. Arrange PLC data table. Repeat all status and alarm bits and analog values (including timer and counter presets) into a separate, contiguous block of memory, grouped by type. Provide 25% space in each group to allow for future expansion.

D. Configure operator interface unit using function keys and instructional prompts so that the operators can modify set-points and presets without any special training or knowledge of the PLC program.

E. A modular and structured approach to PLC program development shall be implemented.

F. The programs shall be broken up in logical segments to allow easy debugging in the field.

G. All real world outputs/inputs shall be grouped such that their addresses can be mapped in contiguous registers to allow use of matrix functions for troubleshooting, debugging, and alarming.

H. An alarm segment shall be developed for all real world outputs.

I. The alarm segment shall be separate from the rung logic for real world outputs.

J. For open/close valves, the associated limit switch positions shall be compared with the PLC output.

1. If the output calls for an open valve, the open limit switch should be made and the closed switch should not and vice versa.

2. Any combination other than these two shall cause an alarm.

K. The PLC shall monitor limit switch positions for valves in transition.

1. Valves in transition (between open and close position) shall be displayed on the operator interface with message "In Transition".

2. The Contractor shall submit limit switch development for all valves.

L. For motors, the run output shall be compared to the run status with the appropriate time delays.

1. Any mismatch between RUN output and RUN status shall cause an alarm.

M. Unless waived in writing by the engineer, application programs written for PLCs shall be written using ladder logic, showing discrete references in individual ladder rungs.

N. Each output shall have its own complete set of logic to aid in startup and trouble shooting.

O. Where duplicate or repetitive logic is required subroutines shall be used to reduce program memory requirements and scan time.

P. The program shall be written in a logical sequence with associated rungs grouped together in a manner to make the system logic clearly evident.

Q. Where multiple rungs use the same constants for associated presets or reference, the constant shall be in the form of a register location and shall be loaded in the beginning of the program each time it is run.

R. All preset register values shall be part of the program and load each time the program is run.

S. Where possible, constants that must be calculated shall have this done in the program.

T. Where values must be input, whether in the program or during operation, software "traps" shall be used to prevent input of values out of range or that will cause improper operation of the system.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS PLCs filed testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. PMCS PLCs monitoring and control criteria specified under this Section shall be verified during PMCS Startup and Field Testing.

C. Refer to section 40 80 82 PMCS Startup and Field Testing for specific field test requirements for PMCS PLCs.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct implementation of the PMCS PLCs specified under this Section.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 67 16 – PMCS PANELS AND ENCLOSURES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, supervision, materials, equipment and incidentals as shown, as specified and required to furnish, install, calibrate, test, start-up and place into satisfactory operation all control panels and/or equipment enclosures, termination cabinets and all associated equipment, as indicated on the Contract Drawings and as specified in this Section.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	3
PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	17
PART 3	EXECUTION	17
3.01	Examination / Preparation	17
3.02	Installation	17
3.03	Field Testing / Quality Control	19
3.04	Startup / Demonstration	19
3.05	Adjusting / Protection / Cleanup	19

C. A schedule of system panels is provided in Attachment A at the end of this Section, for the convenience of the Contractor. The schedule may not indicate all panels and does not indicate all enclosures required for this Contract. The Contractor shall furnish and install all panels and enclosures as required.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 05 05 23.02 – Miscellaneous Metal Fastenings.

C. Section 26 05 27 – Grounding.

D. Section 26 05 53 – Identification for Electrical Systems.

E. Section 26 29 13 – Enclosed Controllers.

F. Section 26 43 13 – Low-Voltage Surge Protective Devices

G. Section 31 23 16 – Excavation.

H. Section 31 23 23 – Fill.

I. Section 40 61 13 – PMCS General Requirements.

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts for the equipment provided under this Section.

B. The spare parts shall be listed in an index and packed in containers suitable for long term storage, provided with labels clearly designating the manufacturer's part number with complete information for use and reordering.

C. The Contractor shall provide minimum the following:

1. Ten (10) percent (minimum of 1), spare space heaters of each type and rating.
2. Ten (10) percent (minimum of 1), spare heater thermostats of each type
3. One (1) spare lighting fixture and switch of each type provided.
4. Ten (10) percent (minimum of 2), spare power supply, regulator, power conditioner, etc., of each type and rating provided.
5. Ten (10) percent (minimum of 1), spare thermal control device (fan, air conditioner, heat exchanger, etc.) for each type and rating provided.
6. Ten (10) percent (minimum of 10), spare fuses, circuit breakers, equipment mounting (DIN) rails.
7. Twenty-five (25) percent (minimum of 100) spare terminals of each type provided for the entire project.
8. Spare parts as recommended by the individual equipment manufacturers.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. NEMA 4, 4X and 12 panels and enclosures shall be as manufactured by:
   1. Hoffman, Anoka, MN;
   2. B-Line, Highland, IL;
   3. Or approved equal.

B. NEMA 7 panels and enclosures shall be as manufactured by:
   1. Adalet, Cardington, OH;
   2. Crouse-Hinds, Syracuse, NY;
   3. Or approved equal.

C. Fiberglass or polycarbonate panels and enclosures shall be as manufactured by:
   1. Adalet, Cardington, OH;
   2. Crouse-Hinds, Syracuse, NY;
   3. Or approved equal.

D. Wire troughs and wire management shall be as manufactured by
   1. Panduit, Lockport, IL;

2. Or approved equal.

E. Circuit breakers shall be as manufactured by:

1. Siemens Industry, Inc., Washington, DC;
2. Allen Bradley (Cat No 1492, 1492-GH);
3. Or approved equal.
4. Or approved equal.

F. Terminal blocks shall be as manufactured by:

1. Entrelec, Montgomery AL;
2. Or approved equal.

G. Fused Terminal blocks shall be as manufactured by:

1. Allen-Bradley;
2. Phoenix Contact, Middletown, PA;
3. Or approved equal.

H. Panel or enclosure heaters shall be as manufactured by:

1. Hoffman (DAH8001B), Anoka, MN;
2. Or approved equal.

I. Panel or enclosure corrosion inhibitors shall be as manufactured by:

1. Hoffman (HCI series), Anoka, MN;
2. Or approved equal.

J. Panel or enclosure heat exchangers shall be as manufactured by:

1. Hoffman (Spectracool), Anoka, MN;
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General Requirements:

1. Furnish and install panels, boxes and enclosures with a NEMA rating based on the table listed in Appendix A in this Section.
2. Panels and enclosures shall meet or exceed the NEMA and NEC (NFPA 70) requirements for the area in which they are installed.
3. Unless otherwise specified or indicated, panels and enclosures shall have a NEMA 4X rating and shall be fabricated of 316 stainless steel.

4. Panels provided as part of a packaged system, from an equipment vendor, (sump pumps, seal water pumps, VFDs, etc.) shall comply with all requirements specified in this Section.

5. The NEMA rating of panels, enclosure and devices shall be as required in their individual Sections if so specified.

6. The sizes of panels and enclosures shown on the Contract Drawings are estimates.

7. The Contractor shall furnish enclosures of the size required to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing, and other components installed in the enclosures while maintaining adequate free space within the enclosure.

8. Panel, box and enclosure doors shall be continuously hinged and shall be of pan construction. Clamp type closures shall be provided.

9. Adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.

    a. Provide sub-panels for installation of all internally mounted components.

    b. Provide mounting strips for installation of all relays and other components where mounting strips are practical.

    c. Sub-panels shall be pan construction to prevent warping.

10. Devices shall be arranged to allow adequate wiring room for ease of connections and servicing.

11. All panel and enclosure components shall be identified both inside and out with engraved, laminated plastic name plates.

12. Panels shall be provided with an engraved laminated plastic sign inscribed "WARNING – This Device Is Connected to Multiple Sources of Power ". Letters shall be 1/2" high, white on a red background

13. Provide all electrical and/or pneumatic connections, components and devices, support hardware, fasteners, interconnecting wiring and/or piping required to make the control panels complete and operational units.

14. Provide bulkhead fittings for all gas, liquid piping and tubing leaving panels and enclosures.

15. Provide all panel-mounted pilot devices as shown and specified.

16. Locate and install all devices, wiring, and components so that connections can be easily made and there is ample room for servicing each item.

17. Components for installation on panel exterior shall be located as shown on the Contract Drawings or as directed by the engineer.

    a. Layouts shall be submitted for approval.

b. All exterior panel mounted instruments shall have a NEMA rating equal to or greater than the enclosure.

c. For panel mounted devices which cannot be obtained with the correct NEMA rating equal to the enclosure, the device shall be mounted behind a transparent viewing window or door, manufactured for the purpose that provides the proper rating.

d. The viewing window or door shall maintain the NEMA rating of the enclosure and be easily opened for access to the instruments.

18. Where permitted by location and layout as shown on the Contract Drawings, all panels and enclosures shall have full height rear access doors, unless otherwise shown.

19. Where rear doors are not possible, panels shall have full height front access doors.

20. All wiring to panel connections from field instruments, devices, and other panels shall be terminated at master numbered terminal strips, unless otherwise specified.

21. Free standing control panel, enclosure or any panel with a dimension of 36 inches or more shall comply with the following:

a. Provide at least one 120 VAC, 15 Amp duplex, grounding type receptacle.

b. At least one 120 VAC LED light fixture complete with a protective plastic shield and capable of generating 25 foot candles on all the components within the enclosure.

c. One 120 VAC, 15 Amp, snap switch in an outlet box with a cover to turn on the light. The switch shall be located so that it is easily accessible from the door.

d. The service light with switch and duplex receptacle shall have their own circuit breaker.

e. The bottom 12 inches and top 6 inches of free-standing panels shall be free of all devices, including terminal strips, to provide ease of installation, wiring and testing.

f. In general, panel indication and control devices shall be mounted within a range of 40 to 72 inches above the operating floor but not less than 36 inches nor greater than 78 inches unless otherwise shown on the Contract Drawings.

g. Annunciators or alarm message display devices shall be mounted up to 84 inches above the operating floor.

h. All instrument read-outs and displays shall be in ENGINEERING UNITS of the desired process variable. Percent of scale or digital

counts are not acceptable unless approved in writing by the Engineer.

i. Panels shall be constructed with an integral fully enclosed solid bottom section at least 6 inches in height from the bottom of the enclosure to the bottom edge of the enclosure door opening.

j. Free standing enclosures shall be mounted on concrete base pad.

k. Free standing panels installed in areas with raised computer type floors shall be provided with an adjustable, welded steel support frame to support the panel from the building structure.

1) The frame load rating shall have a 50 percent safety factor.

2) The frame shall be coordinated with the flooring being installed and shall be flush with the height of the raised floor.

B. Panel and Enclosure Fabrication:

1. Panels and enclosures shall be fabricated as indicated on the Contract Drawings and as specified in this Section.

a. Control panels and enclosures shall be assembled, wired, and tested in the PMCS Supplier's own or other City/Engineer approved facility.

b. All components and all necessary accessories such as power supplies, power conditioning equipment, mounting hardware, input and output terminal blocks, plug strips, relays, lighting, circuit breakers, fuses, and other components which may be required to complete the system shall be provided.

c. The Contractor is directed to review the area classifications with regards to hazardous atmospheres, as they are defined by the NEC (NFPA 70) and NFPA 820.

1) Many areas of the facility within the scope of this Contract are classified as NEC (NFPA 70) Class I, Division I or II hazardous and all construction shall meet those requirements.

2) All equipment, controls, instruments, panels, enclosures, etc., for use in these areas, shall be constructed to meet the area requirements.

d. All control panels and enclosures shall be of formed or welded construction of steel or stainless steel, as required, unless otherwise noted.

e. Panels and enclosures shall be fabricated in accordance with the NEMA ratings as specified, shown, or required.

f. Panels and enclosures shall meet or exceed the requirements of the area in which they are located.

g. As a minimum, a NEMA 12 rating shall be required in all non-corrosive areas and NEMA 4X S/S in outdoor, process, and corrosive areas

h. Where enclosure size or weight requires, provide lifting eye bolts to facilitate handling of the enclosures.

   1) All panels or enclosures with any dimension 72 inches or greater or with a weight in excess of 150 pounds, shall be equipped with lifting eyes.

   2) Bolt lifting eyes directly through the enclosure structural members.

i. Continuously weld all exterior seams and grind smooth.

j. Reinforce sheet steel with steel angles where necessary to adequately support equipment, ensure rigidity, and preclude distortion and resonant vibrations.

k. Panels and enclosure surfaces shall be flat within 1/16 inch over a 24 inch by 24-inch area, or flat within 1/8 inch for a larger surfaces.

   1) Flatness shall be checked by using a 72-inch-long straight edge.

   2) Out-of-flatness shall be gradual, in one direction only, and shall not consist of obvious depressions or a series of wavy sections.

l. Use pan-type construction for doors.

   1) Door widths shall not exceed 36 inches.

   2) Mount doors with full-length heavy-duty continuous piano hinge with stainless steel hinge pins.

   3) Provide handle-operated, oil-tight, key-lockable three-point stainless steel latching system with rollers on latch-rods for easy door closing.

   4) Provide oil resistant continuous gasket completely around each door or opening.

m. Provide interior mounting panels and shelves constructed of minimum 12-gauge steel with a white enamel finish.

n. Provide steel print pocket with white enamel finish.

o. Use 304 stainless steel fasteners throughout.

p. Provide Type 316 stainless steel sun shielding for all outdoor panels.

q. Panels and enclosures shall have adequate wiring space provided on the top and bottom.

1) A minimum of six (6) inches of clear space shall be provided between enclosed equipment and the top and the bottom of the enclosure.

2) Additional space shall be provided when a large number of conduits or wires enter the enclosure.

r. Provide enclosure mounting supports or bases as required for floor, frame, or wall mounted enclosures, and for free standing enclosures.

1) For floor mounted enclosures, provide minimum 12-gauge stainless steel floor stand kits bolted to the bottom of the enclosure, sealed and gasketed to maintain the NEMA rating.

2) Floor stand heights shall be coordinated with enclosure sizes and base pads to comply with the general indication and control device mounting height requirements as specified in this Section or as shown on the Contract Drawings.

3) Floor stands shall be mounted on base pads using anchor bolts or expansion anchors.

s. All panels shall have solid bottoms.

1) Removable panels may be provided to ease punching of conduit entries.

2) Panels and enclosures mounted on raised floors may have open bottoms but shall comply with all codes.

t. Provide all necessary holes and cutouts for installation of equipment.

1) Openings shall be punched or saw cut without distorting the face of the panel.

2) Flame cutting is prohibited.

3) All openings shall be ground straight, square, level and smooth.

u. Provide space and clear area for entry of conduit and wire.

v. Cable and piping shall enter the enclosure through the bottom whenever possible.

w. All conduit and piping openings and all conduits shall be sealed watertight and maintain the NEMA rating of the panel.

x. Panels located inside air-conditioned control room areas shall be NEMA 12 rated stainless steel unless otherwise noted.

y. Fabricate enclosures using minimum 14-gauge stainless steel for wall or frame-mounted enclosures and minimum 12-gauge stainless steel for floor mounted and free standing enclosures. Steel shall be free of pitting and surface blemishes.

z. Standard prefabricated enclosures are preferred.

aa. When required by area classification or Contract Documents, NEMA 7 panels and devices shall be provided.

1) Panels and enclosures, to be installed in areas classified as hazardous (Class I, Div. I or II), per Contract Documents or Codes, shall be constructed to NEMA 7 and Class I, Division I, Group D requirements.

2) In damp or corrosive areas, these panels shall have an "O" ring seal on the door, to prevent entry of corrosive atmospheres.

3) These panels shall be manufactured with all necessary tapped openings to accept devices and conduit entry.

4) Ten (10) percent (minimum of one (1) spare, plugged, tapped, openings shall be provided for each size furnished.

5) Field tapping is not permitted.

C. Environmental Controls

1. Outdoor Panels:

a. Provide thermostatically controlled heaters to maintain temperature inside each enclosure 10°F above the ambient temperature, above 40°F., or that required for component operation (whichever is greater), and to prevent interior condensation over an outside ambient temperature range of -20°F through 120°F.

b. Provide automatically controlled closed-loop heat exchangers or closed loop air conditioners with filtered air louvers when required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure.

c. Provide internal corrosion inhibitor devices for corrosion control inside of each enclosure.

d. Outdoor panels shall be designed to withstand wind driven rain and snow without any moisture entry. The panel shall not be damaged by the buildup of ice or snow.

D. Indoor Panels:

1. Provide automatically controlled heaters as required to maintain temperature approximately 10°F above ambient for condensation prevention inside panels.

1) Panel heaters shall be thermostatically controlled, fan-driven heaters, with all components mounted in an anodized aluminum housing for sub-panel mounting.

2) The heaters shall be powered from 115 VAC from a dedicated circuit breaker and separate panel power feed.

2. Provide automatically controlled closed loop heat exchangers or closed loop air conditioners with filtered air louvers if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure.

1) Heat exchangers and air conditioners shall be of a dual loop design to isolate panel interior air from exterior air.

2) The units shall be thermostatically controlled and shall be powered at 115 VAC from a dedicated circuit breaker and separate panel power feed.

E. Electrical

1. General:

a. Control panel power supply source type, voltage, number of circuits and circuit ratings shall be as shown on the Contract Drawings and as required by the equipment.

b. Unless otherwise noted, power supply to all panels shall be 120VAC 60 Hz.

c. Surge and lightning protection shall be provided for all electronic equipment. Surge and lightning protection shall comply with the requirements of Section 26 43 13 – Low-Voltage Surge Protective Devices.

d. Uninterruptible Power Supply (UPS) units shall be provided to power panels as indicated on the Contract Drawings.

1) As a minimum, a UPS shall be provided for all panels and enclosures containing network, PLC, gas detection, etc. equipment. UPS units shall be furnished and installed as specified.

e. The panels and enclosures shall be provided with internal 120 VAC, 20-amp DIN rail mounted circuit breakers sized as required to distribute power to the panel components and field instruments.

f. Provide quantity of circuits shall include 25 percent spares.

g. Provide a durable legend mounted near the circuit breakers in each panel, which lists the circuit breaker numbers and circuit descriptions.

h. Provide circuit breakers to protect each circuit, with no more than six instruments on a single circuit.

i. Provide DC power supplies of quantities and sizes as required for powering DC signal and control loops.

j. Where wires pass through adjacent panel walls, provide suitable grommets or bushings to prevent cutting or damage of insulation.

k. When DC power and/or low voltage AC power is required, provide and install the necessary power supplies, transformers, regulators and fuses in the panel.

l. All spare field and panel wires, within each panel or enclosure, shall be tagged as spare and labeled and marked as per specifications with “As-Builts” showing their source and destination.

m. Provide complete approved schematic and wiring diagram including spare wiring, showing "As-Built" circuitry.

n. In addition to required submittals, the final approved "As-Built" diagram shall be enclosed in transparent plastic and placed in an easily accessible drawing pocket built in the panel or enclosure door.

2. Electrical Wiring and Accessories:

a. Unless otherwise specified, internal wiring shall be Type MTW stranded copper wire with thermoplastic insulation rated for 600 Volts at 85°C for single conductors.

b. Wiring shall be color coded and labeled with wire identification.

c. For DC signal wiring, use No. 16 minimum AWG twisted tinned copper pairs with overall braided copper shield and drain wire.

d. For AC power wiring, use No. 12 minimum AWG. For AC and DC control use No.14 AWG wiring. For wiring carrying 10 Amps or more, use sizes required by NEC (NFPA 70).

e. Install wiring runs in ventilated wire troughs along horizontal or vertical routes to present a neat appearance.

1) Wire trough shall be filled to no more than 40 percent capacity. Angled runs are not acceptable.

2) Separate and shield DC signal wiring from power and control wiring by a minimum of 4 inches, using separate wire troughs.

3) Separate troughs shall be provided for field wiring.

4) Where practical, in the panels and enclosures, route the low voltage DC signal wiring along the left side of the enclosure sub-panel(s) and route the AC power and control wiring to the right side of the sub-panel(s), with the incoming power and distribution circuit breakers located to the upper right.

f. Group or bundle parallel runs of wire using covered troughs. Maximum bundle size to be 1 inch. Troughs shall have 60 percent spare capacity. Adequately support and restrain all wiring runs to prevent sagging or other movement.

g. In panels controlling and monitoring equipment operating or fed at voltages above 600, wiring used for AC or DC, control, control power, metering, indication, etc. shall be No.14 AWG type SIS (switchboard) wire.

h. Wiring for current transformer (C.T.) circuits shall be minimum #10 AWG type SIS and shall be color coded yellow. Connections shall be by ring type solderless compression terminals.

i. Where wiring runs across a door or panel hinge, the bundle shall be run along the hinge as far as possible and anchored at both ends to distribute the torque along the greatest wire length.

j. Wire bundles running within a panel or onto the door, shall have at least 20 percent spare wires included.

3. Terminal Blocks:

a. Terminate all field wiring and internal panel wiring at 600 Volt barrier type terminal blocks.

b. Panel wiring shall be kept to one side of the strip leaving the other side for field wire termination.

c. Jumpers needed to provide common connections between terminals shall be provided on the panel side of the strip.

d. Terminal blocks shall be tubular screw type with pressure plate capable of accepting #22 through #8 wires and shall be mounted on rigid steel rail.

e. All wiring terminations, both field and panel shall be made with forked tongue solderless crimp type connectors. Field wiring terminals shall have a minimum of a # 8 screw or stud.

f. Heavy duty end anchors shall be provided on both ends of all terminal strips to firmly anchor the terminal blocks to the mounting rail and insulating end barriers shall be provided on one end of the terminal strip as necessary.

g. Terminal blocks shall have a unique identifier for each block and for each terminal on that block (i.e. TB7-25) where the terminal number shall be the unique wire number shown on the approved drawings.

h. No more than two wires shall be terminated at any single screw.

i. Provide jumpers as required to join adjacent terminal blocks for additional wiring connection points. Jumpers shall only be installed on the panel side of the terminal block.

j. All terminal blocks shall be labeled with permanently affixed numeric identifiers on each block.

k. Identifiers shall be self-stick plastic strips with permanent, machine printed numbers.

l. Provide a separate terminal block for landing analog signal cable shield, and separate terminal strips for DC signal and AC power wiring. A separate terminal shall be provided for landing shield wiring.

m. Provide separate terminal blocks for C.T wiring. Terminal blocks for C.T. wiring shall be equipped with shorting bars and screws to selectively short an individual C.T. circuit for maintenance purposes.

n. Provide spare terminal blocks equal in number to 20 percent of the terminals used for each type of wiring (i.e., DC signal and AC power).

o. Terminal blocks shall be copper-nickel alloy terminal strips and screws.

p. Terminal blocks shall have minimum clearance of 5 inch on each side of each strip.

4. Fused Terminal Blocks:

a. Provide fused terminal blocks for all wiring powered from within panels or enclosures to devices located outside the panel or enclosure, as required.

b. Fused terminal blocks shall be UL approved, 600 Volts, capable of accepting #22 through #10 wires, and shall be mounted on rigid

steel rail. Fuses shall be dead front and shall have safety pull out feature.

c. Heavy-duty end anchors shall be provided on both ends of all terminal strips to firmly anchor the terminal blocks to the mounting rail and insulating end barriers shall be provided on one end of the terminal strip as necessary.

d. Provide fuses (sized as required) and fuse pullers for all fused terminal blocks.

e. Provide 20 percent spare fused terminal blocks rail mounted within each panel or enclosure.

f. Terminal blocks shall be copper-nickel alloy terminal strips and screws.

5. Wire Markers:

a. All panel wires and field wires shall have an alphanumeric identification tag at each point of termination.

b. Wire numbers shall be unique.

c. Wire numbers shall be grouped and spaces allowed for additions to each group.

d. Where wire numbers change, the appropriate drawings shall include both wire numbers, clearly indicated, at the point of transition.

e. Each wire number shall be solid, machine printed, and not pieced from other single and/or double digit tags. Wire markers shall be heat, oil, water, tear and solvent resistant, vinyl, tube type markers.

f. All wire labels shall be clearly visible and not hidden by wire duct or other components in the enclosures. All wiring shall be installed such that if wires are removed from any one device, power will not be disrupted to any other device.

6. Grounding / Bonding:

a. All equipment and components mounted in or on control panels and enclosures, shall be bonded to the equipment grounding system.

b. Provide 1-inch-wide by 1/4 inch thick copper grounding bar in each panel or enclosure containing equipment, instruments or controls.

c. The bar shall be as long as needed for the required number of connections, plus 25% future connections (6 inch minimum).

d. Ground bars shall be installed on insulated "standoffs" (1-inch clearance from grounded surfaces), and shall have a braided #6 AWG bonding jumper.

e. Separate buses shall be provided for grounding of AC equipment and for shield grounds.

f. The AC ground bus shall be bonded to the panel frame and system ground.

g. Shield grounds shall be completely isolated from the enclosure and instrument power/equipment grounds.

h. Insulated ground wires shall be run with all control power circuits within the panel to all equipment.

i. Equipment mounting sub-panels (plates) shall be bonded to the frame of the enclosure with a No. 10 AWG braided bonding jumper.

F. Finishes

1. Steel Panels

a. Panels located in control rooms, electrical equipment (switchgear, MCCs) rooms, and office areas, may be carbon steel with a finish as follows:

1) Completely clean all interior and exterior surfaces so they are free of corrosive or oily residue, oil, grease, and dirt.

2) All interior and exterior surfaces shall be phosphatized for corrosion protection for non-stainless steel enclosures.

3) One coat of primer shall be applied to all interior and exterior surfaces immediately, except for stainless steel enclosures.

4) Surfaces shall be electrostatically coated with a polyester urethane powder or epoxy powder coating.

5) Exterior surfaces shall be ANSI- 61 gray, interior surfaces shall be ANSI-61 gray or gloss white.

6) Equipment mounting sub-panels shall be given a gloss white melamine enamel coating. A Grade 1 finish shall be produced on the finish coat.

2. Stainless Steel Panels

a. Panels and enclosures located outdoors, in damp or corrosive areas, tunnels or galleries or in any process areas shall be fabricated of type 316 or 304 Stainless Steel per the manufacturers published recommendations for chemical resistance and service.

b. Stainless steel panel finish shall be brushed or satin and shall be free from blemishes and machine marks.

c. All mounting, anchoring and accessory hardware shall be stainless steel.

3. PVC Coated Panels

a. In hazardous areas, subject to frequent moisture and corrosive elements, panels shall be PVC coated.

b. In areas where the conduit and raceway system, is required to be PVC coated, all panels, control stations and enclosures shall be PVC coated. Colors shall match the conduit system.

c. PVC coating shall be a minimum of 40 Mil. and shall cover all exposed surfaces.

d. All mounting and accessory hardware shall be type 316 stainless.

4. Panel in Highly Corrosive Areas

a. Unless otherwise noted, in areas designated as highly corrosive or where sodium hypochlorite is handled, pumped, metered or stored, panels and enclosures shall be fabricated of molded fiberglass, fiberglass reinforced polyester, or polycarbonate and recommended for the service.

b. Panels shall be finished smooth or finished with gel coat and epoxy.

c. Glass fiber strands shall be neither exposed nor visible.

d. Panels shall be chemical, sunlight and UV resistant.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. Shop and Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used.

3.02 INSTALLATION

A. The Contractor shall install panels in conformance with NEC (NFPA 70) and the Contract Drawings.

B. All panels and enclosures shall be mounted straight, level and parallel to building surfaces.

C. Wall mounted panels and enclosures shall be securely mounted to walls or columns as required. They shall be spaced a minimum of 3/4" from the structure using strut or plates.

D. Stand mounted panels or stations shall be supported using 6-inch epoxy powder coated steel channel securely mounted to the floor with a minimum of three 1/2" stainless steel bolts and leveling nuts.

1. Stand bases shall be grouted for added rigidity.

2. Stands shall be secure and level, shall easily support the mounted equipment and shall hold the equipment rigidly. Multiple stands or fabricated frames shall be used for larger or heavy panels.

E. All freestanding control panels shall be installed on a 6-inch-wide and 4 inch high reinforced concrete curb or 4 inch pad.

1. Pad shall have 1-inch chamfer on all corners.

2. Pad shall extend one (1) inch minimum (plus chamfer) past panel exterior.

F. When panels or enclosures are installed on raised computer type floors, additional supports and bracing shall be provided under the floor as required to prevent the floor from being overloaded.

1. Large and/or heavy panels having any dimension larger than 36 inches or weighing 150 lbs. or more or where the weight of the completed panel exceeds 80% of the specified live load bearing capacity of the flooring, shall be supported from the structural sub floor independently of the raised floor.

2. Provide a welded steel, adjustable support framework the size of the unit footprint capable of rigidly supporting the weight of the entire panel with a 50% safety factor. The frame shall be installed flush and level with the floor.

3. Load and bracing calculations shall be submitted for review.

4. It shall be the responsibility of this Contractor to coordinate raised and finished floor installation requirements with the flooring supplier and installer.

5. In areas where floor modifications are required, and the floor has already been installed, the contractor shall retain the services of an approved flooring contractor to make the appropriate modifications at no additional cost to the City.

G. Panels, and the equipment enclosed, shall be protected from damage during and after installation. If in the opinion of the Contractor or the Engineer, the area is not suitable for electronic equipment or panels, the equipment shall be removed or protected until the area has been secured.

H. Unless otherwise noted, the Contractor shall install indoor panels on 4-inch concrete pad.

I. Extend concrete pad 4 inches beyond outside dimensions of the base, on all sides.

J. Lay grout after panel sills have been securely fastened down.

K. Unless otherwise noted, install outdoor NEMA 4X panels on a reinforced concrete pedestal:

1. Minimum thickness shall be 8 inches with No. 4 steel reinforcing bars at 12 inches on centers, each way.

2. Minimum size shall be 12 inches larger than outer dimensions of base, on all sides.

3. Lay grout after panel sills have been securely fastened down.

L. The Contractor shall provide excavation and backfill work in conformance with Section 31 23 16 – Excavation and Section 31 23 23 - Fill.

M. The Contractor shall provide concrete work in conformance with Section 03 30 00 – Cast-in-Place Concrete.

N. The Contractor shall install anchor bolts and anchor in accordance with Section 05 05 23.02 – Miscellaneous Metal Fastenings.

O. The Contractor shall install and interconnect all equipment, devices, electrical hardware, instrumentation and controls and process controller components into and out of and among the enclosures as indicated on the Contract Drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

ATTACHMENT A
PANEL AND ENCLOSURE SCHEDULE

Control Panel Schedule						
Item	Location	Tag No.	Sheet Ref.	NEMA	Mounting	Nominal Size
1	Upper Gate Chamber	CP-HLO	475-I-006	12	Floor	72” x 60” x 16” (min)
2	Upper Gate Chamber	S5 (CCTV)	475-I-010	12	Wall	20” x 16” x 6” (min)

SECTION 40 78 90 – PMCS PANEL MOUNTED INSTRUMENTS AND DEVICES
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install calibrate, test, startup, and place into satisfactory operation PMCS Panel Mounted Instruments and Devices as described herein and as indicated on the Contract Drawings.

B. The provisions of this Section apply to instruments and devices provided as a part of packaged systems specified elsewhere in this Contract, including but not limited to, function, quality, spare parts, tools, testing, training, documentation and installation.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	13
2.04	Source Quality Control / Shop Tests	13
PART 3	EXECUTION	13
3.01	Examination / Preparation	13
3.02	Installation	13
3.03	Field Testing / Quality Control	13
3.04	Startup / Demonstration	14
3.05	Adjusting / Protection / Cleanup	14

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements

B. Section 40 67 16 – PMCS Panels and Enclosures

C. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

2. PMID - Panel Mounted Instruments and Devices.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. PMIDs and controls shall be provided with all associated services and appurtenant equipment.

B. The Contract Drawings and Specifications illustrate and specify general functional, environmental and construction requirements of PMIDs, and do not necessarily show or specify all components, wiring, piping and accessories required by specific manufacturers, to provide a completely integrated system.

C. The Contractor shall provide all additional components, piping, wiring, accessories, services, labor, etc. required to furnish and install PMIDs and accessories to provide a complete and properly functioning integrated system.

D. The PMCS Supplier acting through the Contractor shall:

1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation, all PMIDs specified or required under this Section.

2. Retain the services of each equipment manufacturer to properly select, apply, size and locate each PMID they are to provide.

3. Also, the manufacturer’s services shall be provided to setup, commission and fine tune all instruments provided.

4. Provide application and design engineering services to properly select, apply, and install; provide detailed design, location, and mounting drawings and to test, calibrate and commission, PMIDs provided herein.

5. Coordinate the installation of all items specified herein and required to ensure the complete and proper operation and interfacing of all the components and systems.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of PMIDs.

C. Manufacturers shall have produced PMIDs for a minimum of 20 years

D. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

E. All material furnished under this Contract shall be determined safe by UL and all material shall be labeled, certified, or listed by the testing agency.

F. Custom made equipment or related installations which are constructed specially for this Contract will not be acceptable.

G. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit PMIDs and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of PMID submittals to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated index of PMIDs.

E. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

F. The manufacturer’s calculations, assumptions and application details, and recommendations shall be submitted to the Engineer for review and approval.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall comply with spare parts, special tools and supplies listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Spare parts and tools shall be as recommended by the manufacturer and shall as a minimum include the following:

1. One PMID for every five (5) PMID of a given model furnished, minimum of one.

2. One (1) communication card for every five (5) of each type furnished, minimum of one.

3. One (1) power supply for every (5) of each size furnished, minimum of one.

4. All spare parts recommended by the manufacturer and listed as recommended spare parts in the approved manufacturer's O&M Manual.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manifolds shall be as manufactured by:

1. Swagelok Company, Solon, OH;

2. Anderson Greenwood-Emerson, Anaheim, CA;

3. Tylok, Euclid, OH;

4. Or approved equal.

B. Removable Connections and End Connections shall be as manufactured by:

1. Swagelok Company, Solon, OH;

2. Tylok, Euclid, OH;

3. Or approved equal.

C. Thermometers shall be as manufactured by:

1. Weiss, Holtsville, NY;

2. Ametek/U.S. Gauge, Feasterville-Tervose, PA;

3. Or approved equal.

D. Signal Loop Isolators shall be as manufactured by:

1. Moore Industries, North Hill, CA;

2. Acromag Inc., Wixom, MI;

3. Or approved equal.

E. Loop Power Supplies shall be as manufactured by:

1. Acopian, Easton, PA;

2. Acromag Inc., Wixom, MI;

3. Or approved equal.

F. Signal Splitters shall be as manufactured by:

1. Moore Industries, North Hill, CA;

2. Or approved equal.

G. Signal Adders shall be as manufactured by:

1. Moore Industries, North Hill, CA;

2. Or approved equal.

H. Control Relay shall be as manufactured by:

1. Idec, East Dundee, IL;

2. Square D, Andover, MA;

3. Allen-Bradley, Milwaukee, WI;

4. Siemens, Washington, DC;

5. Or approved equal.

I. Control panel Pilot Devices shall be as manufactured by:

1. Allen-Bradley, Milwaukee, WI;

2. Square D, Andover, MA;

3. Siemens, Washington, DC;

4. Or approved equal.

J. Digital Process Meters shall be as manufactured by:

1. Precision Digital, Hopkinton, MA;

2. Red Lion, York, PA;

3. Or approved equal.

K. Analog Signal Surge Protection Devices shall be as manufactured by:

1. Bournes, Altadena, CA;

2. Phoenix Contact, Harrisburg, PA;

3. Or approved equal.

L. Operator Interface Terminals shall be as manufactured by:

1. Schneider Electric (Harmony GTO Series), Boston, MA

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Manifolds:

1. Construction:

a. Type: 5-valve and 3-valve meter manifolds.

b. Materials: Type 316 stainless steel body, bonnets, stems, and hardware; Delrin seats; Teflon packing.

c. Connections: 1/2 inch NPTF with Type 316 stainless steel compression type. "Swagelok" connectors.

B. Signal Loop Isolator

1. Design:

a. Provide the necessary quantity to perform all monitoring and control functions as specified and shown on the Contract Drawing.

b. Type: Isolator type signal converter/transmitter/transducer that accepts any standard or many non-standard input signals and produces a 4-20 mA output or another standard process current or voltage signal with three-way isolation (power, signal input, and signal output all isolated from each other).

2. Construction and Required Features:

a. Span Adjustment: 22-turn front panel potentiometer.

b. Zero Adjustment: 22-turn front panel potentiometer.

c. Housing: General purpose enclosure designed for internal panel mounting.

d. Power Supply Input: 117 VAC, 50/60 Hz.

e. Interference Protection: Built-in RFI/EMI protection.

3. Performance Requirements:

a. Calibration Capability: 0.2 percent of span.

b. Ambient Temperature:

1) Range: + 32 F to +158 F.

2) Effect: ± 0.02 percent per Deg F over the entire range.

c. Frequency Response: 5 Hz.

d. Input Current: 4-20 mA into 50 Ohms nominal.

e. Input Voltage: 1-5 Volts.

f. Output Current: 4-20 mA into 0-1200 Ohm load.

g. Output Voltage: 1-5 VDC at 0.25 mA DC max.

h. Span Adjustment: 100 percent ± 25 percent of span, with full scale input.

i. Zero Adjustment: 0 percent ± 10 percent of span, with minimum input.

j. Load Effect: ± 0.02 percent of the span from 0 to maximum load resistance.

C. Control Relay (General Purpose)

1. Design:

a. Type: General purpose, plug-in type rated for continuous duty.

2. Construction Features:

a. Coil Voltage: 24 VDC or 120 VAC as required.

b. Contact Configuration: Number and arrangement as required to perform the intended functions, plus a minimum of one spare SPDT contact per relay function.

c. Contact Material and Rating:

1) General Use: Silver or silver cadmium oxide contacts rated for 10 Amps minimum at 120 VAC.

2) Low Power Switching: Fine silver, gold flashed contacts specifically designed for low power switching, rated for 2 Amps minimum at 30 VDC.

d. Mounting: Pin or blade mount in sockets for sub-panel mounting on DIN rail. Sockets shall have screw terminals for wiring connections, which shall accept a minimum of two #14 AWG wires.

e. Cover: Clear plastic dust cover.

f. Indication: Indicator light.

g. Accessories: Hold-down spring, push-button test.

h. Approvals: UL recognized.

3. Loop Power Supply (Single Loop0

4. Design:

a. Provide DC power for 4-20 mA current loops and as shown on the Contract Drawing.

b. Type: A single output, regulated, plug-in type 24 VDC power supply.

5. Construction Features:

a. Housing: All components shall be enclosed.

b. Mounting: Power supply to plug into the octagonal socket with numbered, screw-type terminals. Provide mounting bracket to secure power supply module in the octagonal base.

6. Performance:

a. Temperature: Operational from -10 to 65 C.

b. Output: 24 VDC, 200 mA.

c. Power Requirements: 120 VAC, 60 Hz, single phase.

d. Regulations: ±0.5 percent.

e. Ripple: 0.5 mV RMS.

f. Protection: Overvoltage protection.

g. Approval: U.L. recognized.

D. Control Panel Pilot Devices

1. Design:

a. Provide selector switches, pushbuttons and indicating lights as specified and shown. All components shall be of the full size, heavy-duty, oil-tight, round type, with modular contacts and NEMA rating equal to that of the enclosure on which devices are installed.

b. Provide individual legend plates for indication of switch, push-button, and light functions (e.g. Open, Closed, Hand-Off-Auto). Legend plates shall conform to the requirements of this Section.

c. Start pushbuttons shall have a flush button, while stop pushbuttons shall have raised pushbuttons.

d. Where noted on the Contract Drawing, pushbuttons and selector switches shall be illuminated type and use the color code as shown.

e. Units shall be Heavy Duty, 30.5 mm, oil tight, and shall maintain the NEMA rating of the panel or enclosure. Corrosion resistant devices shall be provided on NEMA 4 and 4X panels and enclosures.

f. Extra-large, engraved, laminated name plates and function indicator escutcheon.

2. Construction Features:

a. Selector Switch:

1) Two (2), three (3), four (4) and (X) position as shown and required.

2) Maintained or spring return position; maintained contacts; number and arrangement as required to perform intended functions specified but not less than one double pole, double throw, double break contact per switch. Contact rating shall be compatible with AC or DC throughput current of devices simultaneously operated by the switch contacts but not less than 10 Amperes resistive at 120 Volts AC or DC continuous.

3) Heavy Duty, gloved hand operator, extra-large, engraved position indicator.

b. Push-button:

1) Maintained or momentary as required and as shown on the Contract Drawing.

2) Contacts shall comply with requirements specified for selector switches above.

3) Provide extended head push-button for all stop functions, two inch-push/pull the mushroom head and maintained contacts for emergency stop functions, and flush head pushbuttons for all other functions. Emergency stop push buttons shall have padlock attachment.

c. Indicating Lights:

1) Integral transformer type.

2) Low voltage, long life L.E.D. lamps (6 Volts).

3) 0.6 Watts maximum.

4) Integral push-to-test required.

5) Lense colors shall be as follows:

a) Run or Open: Red

b) Off or Closed: Green

c) Fault: Yellow

E. Temperature Sensor/Transmitter

1. Sensor Element

a. Type:

1) Three wire platinum RTD.

b. Function/Performance:

1) Range: As required by the measuring range indicated in the Instrument Device Schedule.

2) Accuracy: Resistance versus temperature shall meet performance requirements of IEC 751 Class B.

3) Maximum Thermal Response Time: 9 seconds to reach 50 percent sensor response when tested in flowing water according to IEC 751.

4) Temperature Coefficient: 100 ohms at 0 degrees C, with a temperature coefficient of 0.00385 ohms/ohm/degree C.

5) Self-Heating: Maximum self-heating factor of 0.15 degrees C/mW.

c. Physical:

1) 316 stainless steel sheath.

2) Spring loaded sensor assembly.

3) Sensor shall penetrate into the pipe where it is installed, by 1/3 to 1/2 of the pipe diameter.

4) Sensor shall be provided with covered connection head. Sensor and connection head shall be NEMA 4X. Where indicated on the drawings to be installed in a hazardous location, the sensor assembly shall be explosion proof approved for Class I, Division 1, Groups C and D.

d. Accessories Required:

1) Sensors shall be installed in 316L stainless steel thermowells. Where exposed to corrosive gasses such as odorous air in odor control applications, thermowells shall be Hastalloy. Thermowells shall be threaded.

2) Extensions shall be provided for sensors installed in insulated pipe. Extensions shall clear the pipe insulation. Extensions shall also be provided where process temperatures are above 100 degrees C.

2. Transmitter:

a. Type:

1) Remotely mounted, two wire, intelligent transmitter compatible with a sensor provided.

b. Function/Performance:

1) Digital Accuracy: plus or minus 0.2 degrees C.

2) Stability: plus or minus 0.1 percent or 0.1 degrees C, whichever is greater, for 24 months.

3) Operating Temperature: -40 to 85 degrees C.

4) Output: 4 20 mA DC linear with temperature. The transmitter shall also communicate using HART protocol.

5) The output may be set as difference or average of two measured temperatures.

6) The output may be configured for custom curves including Callendar-Van Dusen correction.

7) Display: Digital indicator displaying temperature in engineering units.

c. Diagnostics:

1) Self-diagnostics with transmitter failure driving output to above or below out of range limits.

2) LED indication of transmitter faults.

3) Simulation capability for inputs and loop outputs.

4) Test terminals available to ease connection for test equipment without opening the loop.

5) The run-time clock shall be available to determine usage for warranty purposes. 5-year warranty on this clock reading is included.

d. Physical:

1) The enclosure shall be NEMA 4X. Where indicated on the drawings to be installed in hazardous locations, the transmitter shall be explosion proof approved for Class I, Division 1, Groups C and D.

2) The power supply shall be 24 VDC loop powered.

F. Digital Process Meter

1. Type:

a. Digital indicator capable of receiving a 4-20 mA input signal and displaying a scaled value in engineering units.

b. Include options for auxiliary relay outputs and 4-20 mA output for duplicating input signal.

2. General

a. 6 digit display (-99999 to 999999), 0.60” tall

b. Signal input: 4-20 mA

c. Enclosure: 1/8 DIN, high impact plastic

d. Mounting: 1/8 DIN panel cutout

e. Accuracy: +/- 0.03% of calibrated span +/- 1 count

f. Signal Input Conditioning: Linear or square root

g. Relays: 2 SPDT (Form C) internal relays, programmable for high or low alarms

h. Built-in Excitation: 24 VDC at 100 mA

i. Power:

1) Voltage: 24 VDC or 115 VAC (+/-10%)

2) Power: 15 W

j. Environmental:

1) Front Panel Rating: NEMA 4X, IP65

2) Operating Temperature: -40°C to 65°C

3) Storage Temperature: -40°C to 85°C

4) Relative Humidity: 0-90% non-condensing

G. Analog Signal Surge Protection Devices

1. Type

a. 4-20 mA instrument loop analog signal surge protector, ANSI/IEEE C62.41 category A3 rated and series connected

2. General

a. Surge Life (10/1000 micro-Second): >100 operations with 200 Amps

b. Surge Life (8/20 micro-Second): >10 operations with 10,000 Amps

c. Leakage Current at Rated L-G Voltage: >10 micro-Amps

d. Signal/Data Attenuation at Maximum Data Rate : 3dB with 600 Ohm termination

e. Operating Temperature Range: -40 to 60°C

f. Response Time: 50 pico-seconds

g. Peak Clamping Voltage (8/20 micro-Second, 5000 Amps): L-L 55 Volts

h. Peak Clamping Voltage (8/20 micro-Second, 1000 Amps): L-L 45 Volts

i. Load Current: 150 mA

j. Series Resistance: 22 Ohms

H. Operator Interface Terminal (OIT)

1. Type

a. Thin Film Transistor (TFT) color touch screen with 12.1-inch diagonal measurement

2. General

a. Provide OIT capable of Ethernet interface communications with the controller installed in the enclosure.

b. Provide NEMA 4X, gasketed or o-ringed faceplate, flush mounted on the front panel.

c. Where installed outdoors, provide pad-lockable door to match enclosure and protect OIT from the weather, UV, and vandalism.

d. The OIT shall have sufficient capability to display all process variables associated with the respective enclosure.

e. Provide OIT capable of being programmed from an IBM-compatible personal computer by way of a local serial or Ethernet connection.

f. Provide a copy of the development software, serial or Ethernet programming cable, controller interface cable, and other components required to connect the OIT to the programming computer and controller.

g. Provide one package of all the programming software and one new programming cable for the Owner.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS PMIDs shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS OITs PLC monitoring and control criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Contractor shall install each PMID in accordance with manufacturer's recommendations, this Section and the Contract Documents.

B. Panels into which these PMIDs are to be mounted shall provide rigid structural support for the PMIDs and shall allow necessary access and working space to permit maintenance of the PMID while installed.

C. Additional strengthening and/or bracing required for a sound installation shall be provided as part of this contract.

D. Contractor shall provide all supports, bracing, wiring, and incidental hardware.

E. All software required for the PMIDs shall be loaded, configured and fully tested as part of this contract.

F. Contractor shall configure the OITs using function keys and instructional prompts so that operators can operate equipment, modify set points and presets and monitor the system without any special training or knowledge of the PMIDs with which the OIT interfaces.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMIDs Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how PMIDs specified under this Section shall be verified during Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct functioning of all PMIDs.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 79 91 – PMCS FIELD INSTRUMENTS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall retain the PMCS Supplier to provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install calibrate, test, adjust, startup, and place into satisfactory operation PMCS Field Mounted Instruments and Devices as described herein and as indicated on the Contract Drawings.

B. The provisions of this Section apply to PMCS Field Mounted Instruments and Devices provided as a part of packaged systems specified elsewhere in this Contract including but not limited to, function, quality, spare parts, tools, testing, training, documentation and installation.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Installation	8
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	11
3.05	Adjusting / Protection / Cleanup	11

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

B. Section 40 67 16 – PMCS Panels and Enclosures

C. Section 40 80 82 - PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

2. FMID Field Mounted Instrument and Devices, including all field mounted primary sensors and transmitters.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. FMIDs and controls shall be provided with all associated services and accessory equipment.

B. The Contract Drawings and Specifications illustrate and specify general functional, environmental and construction requirements of FMIDs, and do not necessarily show or specify all components, wiring, piping and accessories required by specific FMIDs or specific manufacturers, to provide a completely integrated system.

C. The Contractor shall provide all additional components, piping, wiring, accessories, services, labor, etc. required to furnish and install FMIDs and accessories to provide a complete and properly functioning integrated system.

D. The PMCS Supplier acting through the Contractor shall:

1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation, all FMIDs specified or required under this Section.

2. Retain the services of each equipment manufacturer to properly select, apply, size and locate each FMID they are to provide.

3. Retain the manufacturer’s services to setup, commission and fine tune all FMIDs provided.

4. Provide application and design, engineering and services to properly select, apply, and install, provide detailed design, location, and mounting drawings and to test, calibrate and commission, FMIDs provided herein.

5. Coordinate the installation of all items specified herein and required to ensure the complete and proper operation and interfacing of all the components and systems.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of FMIDs.

C. Manufacturers

1. FMIDs of the named manufacturers shall be furnished.

2. Or equal FMIDS shall be approved by the Engineer before being furnished.

3. FMIDs that are specified in this Section have been selected to establish the standard of quality and performance of the equipment to be supplied.

4. Manufacturers shall have produced the required FMIDs for a minimum of 10 years

5. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

D. All FMIDs furnished under this Section shall UL listed.

E. Custom made equipment or related installation which are constructed specially for this Contract will not be acceptable.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit FMIDs and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of FMID submittals to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated index of FMIDs.

E. Submittals shall be made at least [60] [90] days in advance of any proposed use by the PMCS Supplier.

F. The manufacturer’s calculations, assumptions and application details, and recommendations shall be submitted to the Engineer for review and approval.

G. Reports

1. A Factory Certified Calibration certificate shall be furnished for each FMID furnished under this Contract.

a. At least 60 days before the anticipated initiation of installation testing, the Contractor shall submit [X] copies to the Engineer of the

detailed description of the installation tests to be conducted to demonstrate the correct operation of the FMIDs supplied under this Section.

b. The Contractor shall submit proposal calibration sheets for various types of instruments for the Engineer's approval prior to the start of calibration.

c. Calibration sheets shall include but be limited to date, instrument tag numbers, calibration data for the various procedures described herein, name of person performing the calibration, a listing of the published specified accuracy, permissible tolerance at each point of calibration, calibration reading as finally adjusted within tolerance, defect noted, corrective action required and corrections made.

H. O & M Manuals

1. O&M Manuals shall be submitted for each FMID

2. O&M Manuals shall comply with Section 40 61 13 – PMCS General Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall comply with spare parts, special tools and supplies listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Spare Parts

1. The Contractor shall furnish and deliver the spare parts and test equipment as outlined below.

2. Spare parts shall be identical and directly interchangeable with similar parts of FMIDS furnished under this Section.

3. Spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

4. Spare parts and tools shall be as recommended by the manufacturer and shall as a minimum include the following:

a. One FMID for every five (5) FMID of a given model furnished, minimum of one.

b. One (1) communication card for every five (5) of each type furnished, minimum of one.

c. One (1) power supply for every (5) of each size furnished, minimum of one.

d. All spare parts recommended by manufacturer and listed as recommended spare parts in the manufacturer's submitted O&M Manual.

C. Special Tools

1. Special tools, other than those normally found in a Service Technician's tool box, required to test, diagnose, calibrate, install, wire, connect, disconnect, assemble and disassemble any FMIDs, for service and maintenance shall be provided.

2. Tools and test equipment shall be provided, together with items such as instruction manuals, carrying/storage cases, unit battery charger where applicable, special tools, calibration fixtures, cord extenders, patch cords and test leads, which are not specified but are necessary for checking FMIDs under this Contract.

3. The following test equipment shall also be provided:

a. Portable Calibrators

1) Furnish Two (2) of Portable calibrators capable of measuring DC volts, mV, mA, ohms,frequency, T/C, RTD, peak detect and trip detect on its input and simultaneously generate on its output all of the preceding signals plus two-wire simulation, ramp functions, up/down stepping and 10 point programmability.

2) Each calibrator shall be furnished complete with 24 VDC integral battery pack 120 VAC power adapter, spare battery pack, test leads, external charger, fuse pack, carrying case and appurtenances.

3) Basic accuracy for DC voltages and currents shall be

a) ±0.025%; Resistance

b) ±0.035% for input and ±0.05% for output

c) Frequency:±0.01%.

d) Two (2) portable calibrators shall be furnished.

e) NIST traceable Certificates of Calibration shall be furnished for all calibrators.

4) Portable Calibrators shall be Rochester Instrument System Accupro Diamond or approved equal.

b. Multimeter

1) One (1) Portable digital multimeter (DMM) with rechargeable battery and test leads, and carrying case.

2) Meter shall be furnished with NIST Traceable certificate of calibration

3) Multimeter shall be Fluke Model 8060A or approved equal

c. Hand Tools

1) A complete set of standard hand tools shall be furnished with the equipment.

2) The set shall include approximately 100 tools and shall be supplied in a durable aluminum case.

3) Tool set shall be Jensen Model JTK-17 or approved equal.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Insertion Ultrasonic Flow Meters shall be as manufactured by:

1. GWF, Ocala, FL;

2. Or approved equal.

B. Vibrating Wire Piezometers shall be as manufactured by:

1. Geokon, Lebanon, NH;

2. Or approved equal.

C. Float Level Switches shall be as manufactured by:

1. MadisonSensor, Branford, CT;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General Features

1. All FMIDs supplied shall be the manufacturer's latest design.

2. Unless otherwise specified, FMIDs shall be solid state, electronic, using enclosures to suit specified environmental conditions.

3. Microprocessor-based FMIDs equipment shall be supplied unless otherwise specified.

4. All FMIDs shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks as shown on the Contract Drawings, or as required.
5. Equipment installed in a hazardous area shall meet Class, Group, and Division requirements as shown on the Contract Drawings.
6. All FMIDs for outdoor service shall be furnished in the specified enclosures and or installed in field panels in accordance with Section 40 67 16 – PMCS Panels and Enclosures.
7. It shall not be necessary to provide the manufacturer's NEMA 4 or 4X enclosures for FMIDs which will be subsequently mounted in separate in field panels.
8. All field mounted transmitters mounted outdoors shall be factory installed in thermostatically controlled electrically heated enclosures.
9. Heated enclosures shall be O'Brien VIPAK series or approved equal.
10. Unless otherwise shown or specified, local indicators shall be provided for all FMIDs
11. Where FMIDs are located in inaccessible locations, local indicators shall be provided and shall be mounted as specified in this Section.
12. All indicator readouts shall be linear in process units. Readouts of 0-100% shall not be acceptable (except for speed and valve position).
13. Unless otherwise specified, FMIDs and power supply enclosures shall be 316 stainless steel, fiberglass or PVC coated copper free cast aluminum NEMA 4X construction
14. Where separate sensors and transmitters are required, they shall be fully matched, and unless otherwise noted, transmitters installed adjacent to the sensor.
    a. Special cables or equipment shall be supplied by the associated equipment manufacturer.
15. Electronic equipment shall utilize printed circuitry and shall be coated (tropicalized) to prevent contamination by dust, moisture and fungus.
16. Solid-state components shall be conservatively rated for long-term performance and dependability over ambient atmosphere fluctuations.
17. FMIDs and system components shall be designed for installation in dusty, humid, and corrosive service condition.
18. The PMCS shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models which are currently in production.
19. All equipment provided, where applicable, shall be of modular construction and shall be capable of field expansion.

20. All non-loop-powered instruments and equipment shall be designed to operate on a 60 Hz alternating current power source at a nominal 1115 V, plus or minus 10 percent, except where specifically noted.

21. All regulators and power supplies required for compliance with the above shall be provided.

22. Where equipment requires voltage regulation, power conditioners shall be supplied.

23. All analog transmitter and controller outputs shall be isolated, 4-20 milliamps into a load of 0-750 ohms, unless specifically noted otherwise.

B. Insertion Ultrasonic Flow Meters

1. Refer to Instrument Specification form (Section 40 61 94.225) for all requirements.

C. Vibrating Wire Piezometers

1. Refer to Instrument Specification form (Section 40 61 94.223) for all requirements.

D. Float Level Switch

1. Refer to Instrument Specification form (Section 40 61 94.409) for all requirements.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. FMIDs shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. FMIDs monitoring and control criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Contractor shall install each FMID in accordance with manufacturer's recommendations, this Section and the Contract Documents.

B. Equipment shall be located so that it is accessible for operation and maintenance.

C. The PMCS Supplier shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work

as a whole, and shall supervise the installation of process instrumentation supplied under this Section.

D. Electrical work shall be performed in compliance with NEC (NFPA 70).

E. Equipment Mounting and Support

1. Field equipment shall be mounted on prefabricated pipe stands or metal framing unless shown adjacent to a wall or otherwise noted.

2. FMIDs attached directly to concrete shall be spaced from the mounting surface not less than 1/2-inch by use of phenolic spacers.

3. Expansion shields in walls shall be used for securing equipment or wall supports to concrete surfaces.

4. Unless otherwise noted, field instruments shall be mounted between 48 and 60 inches above the floor or work platform.

5. Embedded pipe supports and sleeves shall be schedule 40, 316 stainless steel pipe, with stainless steel blind flange for equipment mounting as shown on the Contract Drawings.

6. Materials for miscellaneous mounting brackets and supports shall be 316 stainless steel construction.

7. Pipe stands, miscellaneous mounting brackets and supports shall comply with the requirements of Division 5 of the specifications.

8. Where transmitters are supported from process piping, leveling saddles shall be provided.

9. Transmitters shall be oriented such that output indicators are readily visible.

F. Panels into which FMIDs are to be mounted shall provide rigid structural support for the FMIDs and shall allow necessary access and working space to permit maintenance of the FMID while installed.

G. Additional strengthening and/or bracing required for a sound installation shall be provided as part of this contract.

H. Contractor shall provide all supports, bracing, wiring, and incidental hardware.

I. All software required for the FMIDs shall be loaded, configured and fully tested as part of this contract.

J. Contractor shall configure the FMIDs using function keys and instructional prompts so that operators can operate equipment, modify set points and presets and monitor the FMIDs without any special training or knowledge of the controller with which the FMIDs interfaces.

K. Identification Tags

1. All FMIDs shall have an identification tag meeting the following requirements:

a. Tag numbers for FMIDs shall be as listed on the Contract Drawings and Instrument Index attached.

b. The six digit prefix shall be included with the ISA tag number.

c. The identifying tag number shall be permanently etched or embossed onto a stainless steel tag which shall be fastened to the device housing with stainless steel rivets or self-tapping screws of appropriate size.

d. Where neither of the above fastenings can be accomplished, tags shall be permanently attached to the device by a circlet of 1/16-inch diameter stainless steel wire rope.

e. All FMIDs mounted on or within panels shall have the stainless steel identification tag installed so that the numbers are easily visible to service and maintenance personnel.

3.03 FIELD TESTING / QUALITY CONTROL

A. FMIDs Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how FMIDs specified under this Section shall be verified during Field Testing.

C. The Engineer, or his designated representative(s), reserve the right to witness any test, inspection, calibration or start-up activity.

D. Acceptance by the Engineer of any plan, report or documentation relating to any testing or commissioning activity specified herein shall not relieve the Contractor of his responsibility for meeting all specified requirements.

E. The PMCS Supplier shall provide the services of factory trained technicians, tools and equipment to field calibrate, test, inspect and adjust each instrument to its specified performance requirement in accordance with manufacturer's specifications and instructions.

F. Any instrument which fails to meet any contract requirements, or any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced, at the discretion of the Engineer, at no cost to the City.

G. The Contractor shall bear all costs and provide all personnel, equipment and materials necessary to implement all installation tests and inspection activities for equipment specified herein.

H. Field Instrument Calibration Requirements

1. Each FMID shall be calibrated at 0, 25, 50,75 and 100 percent of span using test instruments to simulate inputs and read outputs.

2. Test instruments shall be rated to an accuracy of at least five (5) times greater than the specified accuracy of the instrument being calibrated.

3. If doubt exists as to the correct method for calibrating or checking the calibration of an FMID, the manufacturer's recommendations shall be used as an acceptable standard, subject to the approval of the Engineer.

4. Upon completion of calibration, FMIDs calibrated hereunder shall not be subjected to sudden movements, accelerations, or shocks, and shall be installed in permanent protected positions not subject to moisture, dirt, and excessive temperature variations.

5. Caution shall be exercised to prevent such FMIDs from being subjected to overvoltages, incorrect voltages, overpressure or incorrect air.

6. Damaged FMIDs shall be replaced and recalibrated at no cost to the City.

7. After completion of FMID installation, the PMCS Supplier shall perform a loop check.

8. The Contractor shall submit final loop test results with all FMIDs listed in the loop.

9. Loop test results shall be signed by all Contractor representatives involved for each loop test.

10. Where applicable, test instruments shall have accuracies as set forth by NIST.

I. Calibration Reports

1. The PMCS Supplier shall provide a written calibration sheet to the Engineer for each instrument, certifying that it has been calibrated to its published specified accuracy.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct functioning of all FMIDs.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 80 81 – PMCS FACTORY TESTING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to perform Witnessed Factory Acceptance Testing of all equipment and components of the PMCS, at the manufacturer's facility.

B. Witnessed Factory Acceptance Testing shall verify that the PMCS, its components and associated equipment functions properly both as units and as an integrated systems and that the functional and performance requirements of the Contract Documents are met.

C. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Installation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1. Costs under this Section shall include travel, transport, board and lodging for two representatives of the City or the Engineer to attend all PMCS

WFAT at the PMCS manufacturer's facility or approved test facility, in accordance with Section 01 43 15 – Witness Shop Testing.

2. If PMCS equipment and associated components or part thereof require retesting and witnessing is required the Contractor shall be responsible for the associated cost in addition to the travel, transport, board, lodging, and time cost of the witnesses.

1.03 RELATED SECTIONS

A. Section 01 43 15 – Witness Shop Testing

B. Section 40 61 13 – PMCS General Requirements

C. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. WFAT - Witnessed Factory Acceptance Tests

2. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. General

1. The intent of the WFAT is to ensure that all equipment and components of the PMCS and peripherals to be supplied by the Contractor and intended for operation in the Contract Facility and as defined in the Contract documents demonstrate their performance over their design ranges as individual units and an as integrated system.

2. All the Control Strategy submittals which have been approved for integration into the PMCS and associated equipment shall be demonstrated over the full range of their designed operation.

3. Every attempt shall be made during the WFAT to resolve any issues arising.

4. No issue observed during the WFAT shall be left for resolution during Field Testing unless approved by the Engineer.

5. The Contractor shall provide all necessary supervision, personnel, materials, fluids, facilities, temporary test setups, test fixtures, test equipment, and simulation where approved to perform satisfactory and complete testing.

6. The City representative, Engineer and the Contractor's representative shall be present for all WFATs.

7. Presence of the City and the Engineer at the WFAT does not relieve the Contractor from conforming to the requirements of the Contract Documents.

8. Presence of the City and the Engineer at the WFAT shall in no way imply Acceptance of the PMCS equipment or its components.

B. HMIs

1. Prior to the staging and testing of the system, all display environments shall have been configured per the agreed upon display structure, loaded and data base parameters linked to the specified fields.

C. Notifications and Scheduling

1. The WFAT shall not be scheduled or begun, until all related PMCS Shop Drawings, Test Procedures, Test Documentation and Schedules have been submitted and approved.

2. Integrated PMCS WFAT shall only be scheduled after the PMCS supplier has conducted a non-witnessed factory test and certified that the complete PMCS and associated equipment are ready for a WFAT.

3. The Contractor shall notify the Engineer in writing [60] [90] days before expected initiation of the WFAT.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All PMCS components and associated equipment shall be inspected.

1. Inspection shall include but not be limited to the following:

2. Nameplates and tags

3. Wire sizes and color coding

4. Annunciator and terminal block spares

5. Proper wiring practices and grounding

6. Enclosure flatness, finish and color.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit information on factory testing procedures and schedules to verify that testing shall fulfill the requirements specified in this Section and the Specifications.

C. Submittal shall be made at least 60 days in advance of any scheduled testing and shall include dates of scheduled tests.

D. The procedures for WFATs detailed in this Section shall be submitted for approval by the Engineer.

E. The details of the simulation panel or simulation software which will be used in conjunction with the PMCS equipment shall be submitted to the Engineer for approval.

F. Reports

1. A report on the WFATs completed shall be submitted to the Engineer for approval.

2. Factory test reports shall include the following information:

a. List of tests performed.

b. Certified check lists or documentation verifying all I/O has been tested, as specified in this Section.

c. Document verifying all panel wiring has been checked and conforms to the approved submittals with any correction made during the testing.

d. List of all modifications or corrections identified during the WFAT and corrective action taken.

e. Equipment shall not be shipped from the factory until certified factory test reports indicating satisfactory performance have been submitted and approved by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Factory Testing shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. HMIs and Printers

1. The overall display structure shall be demonstrated, including environment configurations, passwords, security, etc.

2. The display contents of memos shall be reviewed to demonstrate how an operator navigates within the overall display structure.

3. The assignment of displays to annunciator keys shall also be demonstrated.

4. Each graphic display shall be reviewed for correctness in terms of the layout, symbols, color scheme, etc.

5. The operation of standard alarm management displays (Current Alarm Display. Alarm History, etc.) shall also be demonstrated.

6. A demonstration of each type of report specified shall be performed.

   a. Printing shall be an integral part of the report demonstration.

B. PMCS Hardware Operational Testing

1. All input/output devices and components shall be tested to verify operability and basic calibration.

2. All PMCS hardware components and associated equipment shall be tested to verify proper operation of the equipment as standalone units. Test shall include, but not be limited to, the following:

   a. AC/DC power checks

   b. Power fail/restart tests

   c. Diagnostics checks

   d. Test demonstrating that all specified equipment functional capabilities are working properly.

3. All system components shall be tested to verify that communication between units is working properly.

4. An integrated PMCS test with all system equipment connected (excluding field sensors and instruments) shall be performed to verify that all equipment is performing properly as an integrated system.

5. All field sensors and instruments shall be simulated over their operating ranges inclusive of major set points.

C. PMCS Software Demonstration

1. Contractor shall demonstrate all system software utility and security programs incorporated into the PMCS to illustrate the various functions and capabilities specified.

2. Contractor shall demonstrate the operation and display of all software based on a simulation of 20 percent of total input/output count, both analog and discrete, as selected by the manufacturer.

3. The City/Engineer shall also randomly select, at the time of the test, additional inputs and outputs to be simulated in an amount approximately equal to 10 percent of total input/output count.

4. Demonstration shall show that the monitoring and control application software associated with the input/output points performs the functions intended.

D. System performance shall be tested using a fully integrated system, including all software and hardware if applicable.

1. To achieve this, the entire control system, including all the peripheral devices and all interconnecting cables, shall be assembled on the factory test floor and simulated inputs applied.

2. Every device shall have nameplate with description and device's P&ID tag number.

3. Nameplates shall be removable and interchangeable for multiple use during the test.

4. Simulated inputs/outputs shall at minimum include:

a. Toggle switches to simulate field or other input contacts

b. Indicating lights to simulate outputs from tested panels

c. Control relays to simulate MCC coil inputs

d. Time relays to simulate position switches

e. Indications (mA) to indicate every 4-20 mA output from tested panel

f. Potentiometers to simulate 4-20 mA inputs to tested panel

5. The Contractor shall carry out a full system test, during which the entire system shall operate continuously without failure in accordance with the requirements of the Specifications and Drawings

E. Demonstration of communication between PLC's or to remote I/O's shall be included in the Test Procedure where applicable.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 80 82 – PMCS STARTUP AND FIELD TESTING
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all supervision, labor, materials, equipment and incidentals as shown, specified and required to furnish and install all equipment and coordinate all activities necessary to perform check out, start up and field testing of the PMCS and all associated equipment.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	1
1.04	References	1
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	4
1.08	Delivery, Storage, and Handling	5
1.09	Spare Parts, Special Tools, and Supplies	5
1.10	Warranty	5
PART 2	PRODUCTS	5
2.01	Manufacturers	5
2.02	Materials / Equipment	5
2.03	Fabrication / Assembling / Finishes	5
2.04	Source Quality Control / Shop Tests	5
PART 3	EXECUTION	5
3.01	Examination / Preparation	5
3.02	Installation	5
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	10

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 61 13 – PMCS General Requirements.

1.04 REFERENCES

A. Definitions

1. SFT – Start-up and Field Testing.
2. OAD – Operational Availability Demonstration.
3. URT – Upset and Recovery Testing.
4. WFAT – Witnessed Factory Acceptance Tests.
5. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. Start-up and Field Testing of the PMCS and associated equipment shall include but not be limited to the following:

1. Check Out, Start up and Initial Operation of Equipment.
   a. Instrument calibration and operation
   b. Cable and wire testing
   c. Instrument Loop testing
   d. Control panel installation test
   e. Local control of equipment
   f. PLC and I/O operation
   g. I/O loop testing
2. Final Field-testing of Equipment
   a. Control panel operational testing
   b. Instrument full operation testing
   c. Verification of local and remote control of individual equipment
   d. Execution of control strategies for individual equipment
3. Check Out, Start up and Initial Operation of System Equipment
   a. Process control panel local system operation
   b. Preliminary loop tuning
   c. Remote control of systems
   d. Individual and system loop operation
   e. Network and communication link testing
   f. Network and communication performance testing
   g. Execution of local system logic and control

4. Final Field-testing of Systems
    a. Execution of control strategies for equipment systems
    b. Network and communication optimization

B. Integrated System Field Test

C. Operational Availability Demonstration

D. PMCS Upset Testing

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The Contractor shall retain the services of the PMCS Supplier to supervise, coordinate and perform check-out and start-up of all PMCS components and associated equipment.

C. All I/O points, loops, and functions including spares shall be fully operational and undergo Start up and Field Testing.

D. Start up and Field Testing shall be conducted on all PMCS and associated equipment including those for which Factory Testing has been completed.

E. As part of these services, the PMCS Supplier shall include for those equipment items not manufactured by him, the services of an authorized manufacturer's representative to check and certify the equipment installation and place the equipment in operation.

F. Each manufacturer's representative shall be thoroughly knowledgeable about the specific installation, and factory certified in the installation, operation, and maintenance of the equipment.

G. Start-up and Field Testing shall include but not be limited to, field and panel devices, hardware, [software], communications, and programming.

H. Simulators and test equipment may be used for the following test phases:

1. Check-out, Start-up and Initial Operation of all equipment and systems

I. Actual field conditions, process variables and process fluids shall be used for the following test phases:

1. Final Tests
2. Integrated System Field Test
3. Operational Availability Demonstration
4. PMCS URT

J. The PMCS Supplier's personnel shall be present for and participate in all phases of the testing of the entire PMCS including all process equipment and systems monitored and controlled by PMCS.

K. Start-up and Field Testing shall only be considered complete upon the successful performance of all specified functions.

L. Acceptance of PMCS and all associated equipment by the City is contingent upon the approval by the Engineer of all Test Reports.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit information on all SFT procedures and schedules for the approval of the Engineer, to verify that testing shall fulfill the requirements specified in this Section and the Specifications.

C. Submittal shall be made at least 60 days in advance of any scheduled testing and shall include dates of scheduled tests.

D. The details of the simulation panel or simulation software which will be used in conjunction with the PMCS equipment shall be submitted to the Engineer for approval

E. Complete and detailed information, shall include but not be limited to:

1. Test Flow Charts outlining both the testing and responsibilities of all parties.

2. Proposed log sheets showing what, when and how all test parameters will be recorded and by whom.

3. Proposed reporting formats listing all the information to be recorded for each test

F. Test Reports

1. A report on each SFT activity completed shall be submitted to the Engineer for approval.

2. Reports shall include the following information:

a. List of tests performed.

b. All raw field test data, test personnel notes, witness comments

c. Certified check lists or documentation verifying all I/O has been tested, as specified in this Section.

d. Test documentation demonstrating that all digital and analog points of the PMCS residing in all controllers and databases have been conformed to be accurately linked to their respective instrument tag names, database tags and assigned names real or virtual.

e. Document verifying all panel wiring has been checked and conforms to the approved submittals with any correction made during the testing.

f. Confirmation that all modifications or corrections identified during the WFAT have been incorporated into the build of the PMCS and associated equipment tested.

g. Confirmation that all modifications or corrections identified during the SFT have been incorporated into the SFT documentation marked up corrective actions taken.

G. Each major phase of test, such as OAD, shall not commence until certified test reports indicating satisfactory performance of prior major phases have been submitted and approved by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Start-up and Field Testing shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Equipment/System Check Out, Start-up and Initial Operation

1. The Contractor, under the supervision of the PMCS supplier, and other instrument suppliers as applicable, shall perform the following:

a. Check and approve the installation of all PMCS components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.

b. Conduct a complete system checkout and adjustment, including calibration of all instruments, tuning of control loops, checking operation functions, and testing of final control actions.

c. Where future operational functions are included in this work, they shall be included in the check-out.

d. All problems encountered shall be promptly corrected to prevent any delays in start-up of the various unit processes.

2. The Contractor shall provide all test equipment necessary to perform the testing during system checkout and start-up.

3. The Contractor and PMCS Supplier shall be responsible for initial operation of system and shall make any required changes, adjustments or replacements for operation, monitoring and control of the various processes and equipment necessary to perform the functions intended.

4. The Contractor shall furnish to the Engineer certified calibration reports for all field instruments and devices specified in Section 40 79 91 – PMCS Field Instruments and Section 40 78 90 - PMCS Panel Mounted Instruments and Devices, as soon as calibrations are completed.

5. The Contractor shall furnish the Engineer an installation inspection report certifying that all equipment has been installed correctly and is operating properly.

6. The report shall be signed by authorized representatives of both the Contractor and the PMCS Supplier.

B. Integrated System Field Test

1. Following the PMCS and associated equipment checkout and initial operation, the Contractor, under the supervision of the PMCS Supplier, shall perform a complete system test to verify that all equipment and programmed software is operating properly as a fully integrated system, and that the intended monitoring and control functions are fully implemented and operational.

2. Any defects or problems found during the test shall be corrected by the Contractor and then re-tested to demonstrate proper operation.

3. The PMCS including field sensors/transducers and instruments shall be running and fully operational for a continuous 72 hour period.

4. The City and the Engineer shall agree that the Integrated System Field Test has successfully concluded with no issues to be resolved at the end of the 72 hour period.

3.04 STARTUP / DEMONSTRATION

A. Operational Availability Demonstration

1. The OAD shall commence upon approval by the Engineer after the Integrated System Field Test has been accepted by the City and the Engineer.

2. The OAD shall run continuously from initiation, for 60 days, during which time the PMCS and all associated equipment (hardware and software) shall achieve a minimum of a 99.9% or better availability with no system failures.

3. Any system failures which occur after the initiation of the OAD shall cause the current 60 day period to be terminated and a new 60 day period started after the correction of the failure.

4. During the OAD the PMCS and associated equipment shall be available to dam operating personnel for use in normal operation of the dam.

5. For the purpose of the OAD the system will be defined as consisting of the following systems and components:

a. All operator interfaces

b. All hardwired controls

c. All Local Control Stations

d. All PLCs residing in equipment controlled by the PMCS.

6. The conditions listed below shall constitute system failures which count towards the termination of the OAD:

a. Failure to repair a hardware or software problem within 120 consecutive hours from the time of notification of a system failure.

b. If the same hardware or software problem occurs three times or more times.

c. Software problem causing a processor to halt execution.

7. The following conditions shall constitute a system failure in determining the system availability based on the equation specified in this Section:

a. Failure of any non-redundant operator interface or PLC.

b. Loss of communications between devices on the communications network.

c. Failure of one or more input/output components.

d. Failure of any type affecting ten or more input/output points simultaneously.

e. Failure of any type affecting one or more regulatory control loops or sequential control strategies thereby causing a loss of the automatic control of the process variable or process sequence operation.

f. Failure of power supply. Where redundant power supplies are provided, failure of one power supply shall not constitute a system failure provided the backup power supply operates properly and maintains supply power.

g. Failure of the backup supply to operate properly and maintain supply power shall constitute a system failure.

h. Failure of three or more primary sensors/transducers or field instruments simultaneously.

B. The system availability shall be calculated based on the following equation:

1. A = ((TTO)/(TTO+TTR)) x 100% where

a. A = system availability in percent

b. TTO = total time in operation

c. TTR = total time to repair

d. Time to repair shall be the period between the time that Contractor is notified of a system failure and the time that the system has been restored to proper operation in terms of hours with an allowance for the following dead times which shall not be counted as part of the time to repair period.

1) Actual travel time for service personnel to get to the plant site up to 6 hours per incident from the time the Contractor is notified of a system failure.

2) Time for receipt of spare parts to the plant site once requested up to 24 hours per incident.

3) No work shall be done on the system while waiting for delivery of spare parts.

4) Dead time shall not be counted as part of the system available period.

5) The dead time shall be logged and the duration of the OAD extended for an amount of time equal to the total dead time.

C. All parts and maintenance materials required to repair the system prior to completion of the OAD shall be supplied by the Contractor at no additional cost to the City.

D. If parts are obtained from the required plant spare parts inventory, they shall be replaced to provide a full complement of parts as specified.

E. A Plant Monitoring and Control System Malfunction/Repair Reporting Form shall be completed by the plant personnel and the Engineer to document system failures, notifications to the Contractor, arrival and repair times and the Contractor repair actions. Format of the form shall be developed and agreed upon prior to the start of the OAD.

F. PMCS Upset and Recovery Testing.

1. The Contractor shall conduct Upset and Recovery Testing of the entire PMCS provided under this contract and all equipment monitored or controlled by the System.
2. URT shall prove the fault tolerance and failure response across the entire PMCS.
3. URT shall be performed after the OAD and shall be imitated from a steady state condition of the PMCS.
4. URT shall continue for three consecutive workdays (24 hours).
5. URT shall consist of intentional, non-destructive shutdown and failure of portions of the PMCS equipment, and systems.
6. The Engineer and the City shall randomly pick individual pieces of operating equipment such as valves, gates, instruments, controls, etc. to be disabled or tripped and process variables and set points to be modified.
7. The PMCS and associated equipment shall respond as specified to the upset.
8. PMCS and associated equipment responses shall be monitored and recorded.
9. Various failure modes and conditions shall be tried on all equipment.
10. Failure modes to be tested shall include but not be limited to:
    a. closing valves
    b. stopping flows
    c. emergency stops
    d. set point changes
    e. simulated scenarios
    f. the system bypasses, etc.
    g. Multiple failure scenarios shall also be tried.
    h. Full manual and semiautomatic back up modes shall also be tested
    i. UPS run times shall be tested and several PMCS equipment “black starts” shall be attempted to test PMCS restart capability after a prolonged power outage.

j. Workstations, servers, controllers and software shall be stopped; portions of and the entire network shall be disabled.

11. PMCS URT Responses

a. The PMCS must respond immediately by

b. generating the proper alarms

c. starting backup or sequential equipment

d. shutting down remaining affected equipment in accordance with the Control Strategies, programmed sequences, and safety and interlock logic.

e. All equipment and controls shall respond per design.

f. Each PLC must continue to control properly, monitor and alarm the equipment that it operates while disconnected from the PMCS.

g. Portions of the PMCS which have been stopped shall not cause usable portions of PMCS to stop running.

12. PMCS URT Recording

a. Status of the PMCS shall be recorded and monitored.

13. Unexpected or undesirable results, or failure of PMCS to correctly respond to an upset, shall result in stopping the test, making repairs or changes, retesting the changes and then restarting the test.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

41 67 16 – FALL PROTECTION SYSTEMS
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes requirements for the supply and installation of fall protection, fall restraint and fall arrest systems and related appurtenances for the spillway crest, access stairs on the downstream spillway steps, and the portable fall protection system intended for use in the HLRT. Subsequent reference to "fall protection" systems herein is intended to generally encompass all manner of fall protection, restraint, or arrest. It is the intent that these systems be installed for the City's use following completion of construction. The Contractor shall be responsible for providing any fall protection systems necessary for its use or the use of the Engineer during performance of construction operations in the locations listed above during this Contract. The Contractor shall furnish, fabricate (where necessary), and install all fall protection system items, with all appurtenances, accessories and incidentals to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein.

B. Contractor is specifically alerted that an existing fall protection system was provided under construction contract CAT-212B that extends along the spillway crest. Work under construction contract CAT-475 includes modification to, and extension of, the existing spillway crest fall protection system, and compatible materials and equipment are required.

1. The existing system is as described in Paragraphs 2.01.A and 2.02.B.
2. Identical materials and equipment shall be supplied for the spillway crest rail system.
3. Existing rail system components that are designated for removal shall not be reused and shall be disposed of as directed by the Engineer.

The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4

2.02 Materials / Equipment 5
2.03 Fabrication / Assembly / Finishes 6
2.04 Source Quality Control / Shop Tests 8
PART 3 EXECUTION 8
3.01 Examination / Preparation 8
3.02 iNSTALLATION 9
3.03 Field Testing / Quality Control 9
3.04 Startup / Demonstration 9
3.05 Adjusting / Protection / Cleanup 9

1.02 PAYMENT

A. Payment for all work specified in this Section shall be included in the lump sum price bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 73 17 – Installation of Equipment

B. Section 01 78 25 – Operations and Maintenance Manuals

C. Section 03 30 00 – Cast-in-Place Concrete

D. Section 05 50 00 – Metal Fabrications

1.04 REFERENCES

A. American National Standard Institute, Inc. (ANSI)

1. A 10.14 Safety Belts, Harnesses, Lanyards, Lifelines, and Drop Lines for Construction and Industrial Use

B. American Society for Testing and Materials (ASTM)

C. Occupational Safety and Health Administration (OSHA)

1. 29 CFR 1910 Occupational Safety and Health Standards.

1.05 DESCRIPTION

A. Not Used.

1.06 QUALITY ASSURANCE

A. Manufacturer's Field Representative: At all times during installation of the fall protection system(s), a certified manufacturer's field representative shall be present to supervise and direct the installation of the fall protection system(s) at all locations of the system(s). The qualifications of the certified manufacturer's field representative shall consist of experience in the complete installation of five (5) separate fall protection or arrest systems within the last three years.

B. In order to assure uniform quality, ease of maintenance and minimal parts storage, all similar equipment called for under this Section shall be supplied by a single

source. The supplier shall, in addition to the Contractor, assume the responsibility for proper and complete installation.

C. Coordinate anchorage system with supporting structure. Fabricate and locate anchoring devices as recommended by manufacturer to provide adequate support for intended use.

D. Fabricate joints in a manner to discourage water accumulation. Provide weep holes to drain any water that could accumulate in the exposed joints.

1.07 SUBMITTALS

A. Product Data: At least 30 days prior to start of installation of the fall protection system(s), provide manufacturer's data and product information for manufactured materials and products, including nylon lanyards and body harnesses, for review and approval by the Engineer.

B. Shop Drawings: At least 30 days prior to start of installation of the fall protection system(s), provide manufacturer's shop drawings for fabrication and erection for review and approval by the Engineer. Include plans, member profiles, sizes, elevations, and details for anchorages and connections on the spillway crest, in the spillway channel, transition area, plunge pool, end sill, and plunge pool apron.

C. Qualifications Information: At least 30 days prior to start of installation of the fall protection system(s), provide qualifications information of manufacturer's full-time field representative who will supervise installation of the fall protection system(s). The qualifications information shall include owner's name, address, date and details of installation for at least five (5) separate owners of past projects within the last 3 years that were supervised by the proposed field-representative.

D. Maintenance Manual: At least 30 days prior to contract completion, provide manufacturer's maintenance manual indicating parts list and maintenance requirements for all equipment, in accordance with the requirements of Specification Section 01 78 25 – Operation and Maintenance Manuals.

E. Operation Manual: At least 30 days prior to contract completion, provide operation manual indicating proper procedures and equipment for safe operation of the system(s), in accordance with the requirements of Specification Section 01 78 25 – Operation and Maintenance Manuals.

F. Test Certificate: Within 3 days after manufacturer's representative tests the fall protection system(s), provide test certificate(s), signed and certified by the manufacturer's representative, indicating whether installed system(s) passed or failed proof load testing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The spillway crest and access stairs fall protection systems shall be the UniRail System and Single Point Anchorage System, respectively, by 3M (which has acquired both Uniline Safety Systems and DBI-SALA since original installation), or approved equal(s).

B. Portable Fall Protection System: All materials for the Portable Fall Protection System shall be provided by one manufacturer.

1. Manufactured by:
   a. FallTech, Compton, CA
   b. Or approved equal.
2. Portable Davit System:
   a. Offset Davit Arm, 24" to 44" with Device Receiver Bracket (6500244) as manufactured by FallTech, Compton, CA;
   b. Lower Mast Extension for Confined Space Davits, 45" (6500545) as manufactured by FallTech, Compton, CA;
   c. Or approved equal.
3. Portable Davit System Winch:
   a. DuraTech 60-foot 3-Way Retrieval SRL-R and Retrieval Winch with Stainless Steel Cable for Davits (7281DS) as manufactured by FallTech, Compton, CA;
   b. Or approved equal.
4. Portable Davit System Recessed Base: Provide the following at each access HLRT Operating Room hatch location:
   a. Flush-mount Stainless Steel Cast-in Fixed Davit Base (65030CFS) as manufactured by FallTech, Compton, CA;
   b. Stainless Steel Sleeve Caps for Fixed Davit Bases (65080SCS) as manufactured by FallTech, Compton, CA;
   c. Or approved equal.
5. Portable Davit System Storage: Provide the following at the High Level Release Tower at a location selected by the City:

a. Wall-mount Stainless Steel Bolt-on Fixed Davit Base (65070WMS) as manufactured by FallTech, Compton, CA;

b. Or approved equal.

C. Removable Guardrail System shall be as manufactured by:

1. FallTech, Compton, CA;

2. Or approved equal.

D. Safety Post for access ladders: Provide one of the following for each ladder:

1. LadderUp Safety Post Model LU-4 as manufactured by The Bilco Company, Hillside, NJ

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General: It is the intent that these systems be installed for the City's use following completion of construction of the dam. The Contractor shall be responsible for providing any fall protection system(s) necessary for its use or the use of the Engineer during performance of construction operations on the spillway crest and downstream spillway steps during this Contract.

B. The existing systems were designed and installed by:

1. Evan Fall Protection, 22 Southwest Ave., Jamestown, RI 02835 (Phone: 401-423-2230).

2. Any alternate designer / supplier shall provide compatible products with the existing features and be willing and able to certify the modified system upon completion in accordance with these specifications and applicable rules and regulations.

C. Fall protection systems shall be designed under the supervision of a Professional Engineer qualified in the design of horizontal fall protection system.

D. Verify all existing site dimensions prior to commencing design. Report unsatisfactory site conditions to the Engineer in writing. Indicate measurements on shop drawings.

E. The spillway crest fall arrest and fall restraint systems shall be designed to allow users to walk uninterrupted the entire length of the system without having to unhitch from the system to pass-through intermediate support points. The systems shall be designed to support a maximum of two users in case of a fall and to prevent the users from free falling more than 6 feet. The system shall be designed for hands-free operation once the user is properly attached to the system. All components shall be designed by the fall protection system manufacturer and shall meet the applicable requirements of OSHA 1910 Subpart D - Walking-Working Surfaces and 1910.140 - Personal fall protection systems. Furnish and

install each system complete with all necessary hardware recommended by the manufacturer.

F. Portable Fall Protection System:

1. Provide one offset davit arm with device receiver bracket with telescoping adjustable reach to keep lifeline correctly centered over access locations. Material shall be powder coated 6061 aluminum and plated steel. Minimum performance shall be as indicated below:

   a. Rescue static strength: 5,000 lb min.

   b. Entry/Egress static strength: 1,800 lb min.

   c. Rescue user capacity: 2 users, 310 lb max. for each person.

   d. Entry/Egress capacity: 1 user, 310 lb max.

2. Provide flush-mount plated steel cast-in fixed davit base at each access hatch location. Location of embedded base shall be coordinated with Portable Fall Protection System Manufacturer and shall be submitted to the Engineer for review and approval prior to concrete placement. Material shall be plated carbon steel with PVC pipe sleeve insert.

3. Provide one wall-mount stainless steel bolt-on fixed davit base for storage of davit arm when not in use. Material shall be stainless steel with 9-inch deep PVC sleeve insert.

4. Portable fall protection system shall comply with OSHA 1910 Subpart D – Walking-Working Surfaces and 1910.140 – Personal Fall Protection Systems.

5. Manufacturer and products as indicated in Article 2.01.C.

2.03 FABRICATION / ASSEMBLY / FINISHES

A. Unless stated otherwise, all components shall be manufactured from type 316L stainless steel and shall conform to ANSI Z359.1: (R1999), “Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.”

B. Castings: ASTM A743/A743M, Grade CF 8M or CF 3 M.

C. Plate and Sheet: ASTM A666, Type 316L.

D. Type 1: UniRail System

1. The traveling device shall connect to the user’s self-retracting lifeline system and to the rail system. The device shall be designed to enable the user to move safely and easily along the length of the system. The device shall enable passage over intermediate support points without being released from the rail. A locking mechanism shall secure the device onto the rail and prevent it from releasing accidentally. The traveling device must be able to be connected and disconnected at the beginning and at the end of the rail system. Provide the City with four (4) traveling devices.

Furnish one traveling device in a pouch of each of the four (4) harness belts that are to be provided.

2. Rigid Rail: T6 Aluminum AA25 anodized.

3. Rail ends: injection molded Alkathene.

4. System rail stop: T6 Aluminum AA25 anodized.

5. Traveling device: T6 Aluminum AA25 anodized body, 316 Marine grade stainless steel hardware, and Delrin self-lubricating polymer wheels with high impact resistance and low pick-up so that the wheels remain smooth and burr free during normal use.

E. Type 2: Single Point Anchor System: Provide Single Point Anchors where indicated on the drawings plus six (6) extra to be provided to the City for future installation. Single Point Anchor shall have minimum capacity of 5,000 pounds. The anchor will utilize pre-installed sockets and enable the user to connect and disconnect from the anchorage by pressing a release button. Concrete Single Point Anchors shall be provided by DBI-SALA or an approved equal.

F. Support Harness: At the completion of the installation of the spillway crest fall protection system(s), provide the City with four (4) new and unused full-body harnesses. Harness shall meet or exceed all applicable industry standards including OSHA, ANSI, and ANSI Z359. The harness shall be a Delta II Construction Vest-Style (Quick-Connect) provided by DBI-SALA or approved equal. The harness shall have a spring loaded stand-up back D-ring, a tongue buckle body belt with side D-rings, adjustable non-slip chest strap with quick-connect buckle, parachute buckles on lower shoulder straps and be universal in size.

G. Lifeline: At the completion of the installation of the fall protection system(s), provide the City with four (4) new and unused, 7.5 ft, twin leg, self-retracting lifelines. Each lifeline shall meet all applicable industry standards, 5,000 lb gate strength snap hooks, 3.5 ft of tieback webbing, impact indicators on each leg, quick connect handle allowing it to be mounted to a full-body harness and durable nylon plastic housing. The 7.5 ft, twin leg, self-retracting lifeline shall be a Tie-Back Talon provided by DBI-SALA or approved equal.

H. Pouch for Harness Belt: At the completion of the installation of the fall protection system(s), provide the City with four (4) new and unused, pouches. Pouch shall be approximately 7-1/2” x 7-1/2” x 3”, have belt loops for easy attachment to harness belt and have a snap closure. Pouches shall be provided by DBI-SALA or an approved equal.

I. Provide full-body harness, self-retracting lifeline and pouch and furnish by attaching self-retracting lifeline and pouch to full-body harness.

J. Carabiner: At the completion of the installation of the fall protection system(s), provide the City with two (2) new and unused, carabiners if not supplied with each lifeline with retrieval winch. Each carabiner shall meet or exceed all

applicable industry standards including OSHA and new 2007 ANSI Z359, have an 11/16" gate opening, self-closing/self-locking gate, gate face load of 3,600 lbs, side gate load of 3,600 lbs, withstand minor axis load of 3,600 lbs and have minimum tensile strength of 5,000 lbs. Carabiners shall be Saflok Steel Carabiner provided by DBI-SALA or an approved equal.

K. Lifeline with Retrieval Winch: At the completion of the installation of the fall protection system(s), provide the City with two (2) new and unused, sealed self-retracting lifelines with retrieval winch. Each lifeline shall meet or exceed all applicable industry standards including OSHA, ANSI and ANSI Z359, 85 ft 3/16" stainless steel, built in retrieval winch, self-adjusting disc brake, reserve lifeline retention system and self-locking swivel snap hook with impact indicator. Lifeline shall be provided by DBI-SALA or an approved equal.

L. Furnish each sealed self-retracting lifeline with retrieval winch in a 10-1/2" x 12" x 19" DBI-SALA duffle bag or an approved equal, with a carabiner attached to the anchorage handle of the lifeline.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The certified manufacturer's field representative shall be present at all times during the installation of the fall protection system to supervise and direct the work.

B. Install all equipment in accordance with approved shop drawings and manufacturer's instructions.

C. Install anchorages and fasteners in accordance with manufacturer's recommendations to obtain the allowable working loads published in the product literature and in accordance with this Section.

1. Do not load or stress fall protection system until all materials and fasteners are properly installed and ready for service.

2. Anchorages drilled into concrete.

a. Follow manufacturer's recommendations.

b. Do not cut or damage steel reinforcement or other embedded items within concrete structures.

c. Clean drill holes and remove debris and contaminants in accordance with manufacturer's instructions.

d. Install anchorages at indicated locations, clearances and embedment depths.

e. When clearance and spacing of anchorage is not indicated on the Contract Drawings, install at location recommended by manufacturer to obtain maximum working loads and in accordance with the following:

1) Anchorage clearance to edge of concrete: Not less than 7 bolt diameters.

2) Anchorage spacing center to center: Not less than 10 bolt diameters.

f. When embedment depth is not indicated on the Contract Drawings, install with embedment depth not less than 6 bolt diameters.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. After the fall protection system is properly installed at the spillway crest and access stairs on the downstream spillway steps, and prior to placing each system into operation, the manufacturer's approved authorized representative shall inspect and operate each system and shall make all final adjustments for proper operation.

B. Prior to placing the system at each location into operation, the manufacturer's approved authorized representative shall perform proof testing and issue a certificate attesting to the system's ability to withstand the proof load. If any system(s) fails the proof load test, correct deficiencies as recommended by the manufacturer's representative and have the manufacturer's representative re-test the system until it passes the proof load test.

C. Record and submit to the Engineer the date(s) on which each anchorage point of the spillway crest fall arrest and fall restraint systems are installed. The Contractor shall be responsible for performing and documenting the annual inspection, performed by the manufacturer's representative, of each anchorage point until the system is turned over to the DEP. This documentation shall be provided to the DEP when the system is turned over.

3.04 STARTUP / DEMONSTRATION

A. Operator Training: At the completion of the installation of the fall protection system(s), the manufacturer's representative shall provide the City with a minimum of 8 hours of operator training. The training session shall be a single one-day class conducted at the installation site.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Remove all loose materials, crating and packing materials from premises.

– END OF SECTION –

SECTION 46 66 00 – WATER TREATMENT SYSTEM
CONTRACT CAT-475

PART 1 GENERAL

1.01 SUMMARY

A. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	2
1.03	Related Sections	3
1.04	References	3
1.05	Description	4
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	7
2.01	Manufacturers	7
2.02	Materials / Equipment	7
2.03	Fabrication / Assembling / Finishes	8
2.04	Source Quality Control / Shop Tests	8
PART 3	EXECUTION	8
3.01	Examination / Preparation	8
3.02	Implementation	10
3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	11
3.05	Adjusting / Protection / Cleanup	11

B. The Contractor shall furnish, install, operate and maintain temporary water treatment equipment and systems as shown, specified and required, to treat water from the following sources for discharge to Schoharie Creek, its tributary streams, or groundwater:

1. Concrete washout and runoff
2. Installation of anchor bars
3. Masonry cleaning
4. Dewatering and unwatering operations
5. Foundation and concrete surface preparation for concrete
6. Demolition and removal activities
7. Unforeseen Construction Wastewaters as directed by the Engineer
8. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials.

9. Operations for subsurface exploration, concrete or masonry coring, and drilled drains.

C. All water from construction activities shall be treated before discharge into any surface water bodies, unless the turbidity of the effluent is less than three times the ambient level of the receiving water body as measured by the turbidity meter in Nephelometric Turbidity Units (NTUs) and the pH of the effluent is between 6 and 9.

In addition, the Contractor shall comply with 40 CFR Part 450. The rule is subject to change but is currently written to require the following: Commencing August 1, 2011 the maximum daily average turbidity for each discharge from the site shall not exceed 280 NTU when the total site disturbance is 20 acres or greater. Commencing February 2, 2014 the maximum daily average turbidity at each discharge from the site shall not exceed a limit of 280 NTU when the total site disturbance is 10 acres or greater. Total site disturbance shall be taken to mean the combined disturbance from Contracts CAT-475 and Contract CAT-212E. The aforementioned turbidity limits shall not be applicable for discharges in any day resulting from storm events exceeding the 2-year, 24-hour storm on that same day. The 2-year, 24-hour storm for the site will be considered to be 3 inches.

D. The Contractor shall provide standby equipment and power supply for maintaining uninterrupted water treatment.

E. The Contractor shall obtain all necessary permits from State and local agencies for operation of the water treatment system and disposal of the effluent.

The Contractor shall provide a Water Sampling and Analysis Plan (WSAP) and arrange for the services of a New York State Certified laboratory, for the collection and analyses of effluent to determine the quality of effluent prior to disposal.

1.02 PAYMENT

A. Payment for all work specified under this Section will be made as part of the lump sum price bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment. This shall include the cost of equipment, labor, materials, operation, maintenance, testing, monitoring, handling, disposal, all incidental work, permits, overhead and profit for the water treatment system.

1. The lump sum shall provide for the costs of the development and implementation of a Plan for the Water Treatment System. The lump sum price shall include the treatment of unforeseen construction water sources not listed in Article 1.01.B.

2. There shall be no additional payment for offsite disposal of any other wastewater treatment system effluent outlined in this Section or due to non-compliance with the terms of the New York State Pollutant Discharge Elimination System (SPDES) Permit. All labor, material, and costs associated with transferring water from the wastewater treatment system to containers/trucks for hauling off site, hauling costs, road permits, disposal fees, incidentals, or any other item necessary and required to complete the

offsite wastewater disposal shall be included in the lump sum price bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment. Payment for the Water Treatment System Effluent will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount water delivered is returned with complete chain of custody documentation to the City and the Engineer.

3. Measurement for offsite untreated sediment disposal will be based on the number of tons or fraction thereof of untreated sediment lawfully disposed of from the water treatment system. The number of tons disposed will be measured by weighing the disposal truck at a certified truck weighing location capable of producing a weight ticket. Payment will be made under lump sum price item bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment. All labor, material, and costs associated with transferring the sediment from the treatment system to containers/trucks for hauling off site, hauling costs, road permits, disposal fees, incidentals, or any other item necessary and required to complete the offsite sediment disposal shall be included in the lump sum price item bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment. All component and related costs shall be included in the lump sum price item bid for Contract Reference Item No. LS-2, as described in Section 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 02 24 20 – Soil Sampling and Analysis

B. Section 31 25 10 – Dust, Soil Erosion, and Sedimentation Control

C. Section 03 10 00 – Concrete Formwork

D. Section 03 21 00 – Reinforcing Steel

E. Section 03 30 00 – Cast-in-Place Concrete

1.04 REFERENCES

A. Most recent version of the New York State Department of Environmental Conservation (NYSDEC) Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities, (2008 or later).

B. Most recent version of the New York State Standards and Specification for Urban Erosion and Sediment Control (Blue Book), (2005 or later).

C. Most recent version of the New York State Stormwater Management Design Manual, (2008 or later).

D. Urban/Stormwater Runoff Management Practices, NYSDEC, 2002 or most current version.

E. California Stormwater BMP Handbook, California Stormwater Quality Association.

F. ASTM standards applicable to piping, equipment and other items required for a complete water treatment system.

G. Concrete Batch Plants Waste Reduction Assistance, Pinellas County (Florida) Department of Environmental Management Pollution Prevention and Resource Recovery Program.

H. USEPA 40 CFR Part 450.

1.05 DESCRIPTION

A. Definitions:

1. Construction wastewater: Water generated by any of the activities identified in Article 1.01.A, above, or as identified by the Engineer.

2. Concrete Washout Treatment System: System of water retention structures, sumps, ejectors, pumps, power supply, treatment chemicals including coagulants (if any), and treatment equipment designed by Contractor, submitted to and approved by the Engineer prior to water-generating activities that will effectively contain and treat wastewater generated from concrete washout and runoff; installation of anchors with fresh concrete or grout; wastewater generated from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials; and wastewater from any other construction activities producing wastewater containing fresh (uncured) concrete or having a pH outside of the range 6 – 9. Concrete cure water should be applied so that it results in no runoff. Any runoff from concrete cure water that has come in contact with fresh uncured concrete should be treated with the concrete washout treatment system.

3. Water from the concrete washout treatment system shall be discharged off site in accordance with the requirements of the New York State Pollutant Discharge Elimination System (SPDES) permit and in accordance with the latest NYCDEP, OSHA standards, and all other applicable Federal, State and local regulations.

4. Construction Wastewater Treatment System: System of water detention structures, sumps, ejectors, pumps, power supply, treatment chemicals including coagulants (if any), and treatment equipment designed by Contractor, submitted to and approved by the Engineer prior to water-generating activities that will effectively treat wastewater from installation of anchors without fresh concrete or grout, masonry cleaning, dewatering operations, foundation and concrete surface preparation for concrete; demolition and removal activities, and any other construction activities not containing fresh concrete and having a pH within a range of 6 – 9.

   Water effectively treated to the standards specified in Section 3.04 may be discharged to the on-site storm drainage network, which ultimately discharges to Schoharie Creek, in accordance with the requirements of the SPDES permit and in accordance with the latest NYCDEP, OSHA standards, and all other applicable Federal, State and local regulations.

1.06 QUALITY ASSURANCE

A. The water treatment system work shall be performed by a general contractor or a specialty subcontractor specializing in and having experience installing and operating water treatment systems in similar conditions for at least five years.

B. Water treatment system shall be designed by a Professional Engineer licensed in the State of New York having experience in successfully designing a system in similar site conditions.

1.07 SUBMITTALS

A. The Contractor shall provide all submittals, including the following, as specified Article 4 - Contractors Working Drawings, Design and Shop Drawings of the General Conditions and in Sections.

1. Pre-construction Submittals: Approval of the water treatment system by the Engineer or City shall not in any way relieve the Contractor from full responsibility for the complete and adequate design and performance of the water treatment system to provide the necessary level of treatment. A Water Treatment System Plan shall be submitted to the Engineer and the NYSDEC at least 30 calendar days prior to the anticipated commencement of treatment operation and, at a minimum, shall include the items listed below. Commencement of the water treatment system operations may not begin until approval by the Engineer has been obtained.

a. Design calculations demonstrating the adequacy of the proposed water treatment system.

b. Working Drawings shall include a complete description of equipment and materials to be used, including flow schematics; water retention structures; pump sizes and ratings; pipe material; sizes and invert elevations; tank material and interior and exterior dimensions; and weir sizes and elevations. All working drawings shall be signed and sealed by a Professional Engineer, licensed in the State of New York, as described in Section 1.07B.

c. The procedures to be followed in installation, operation and maintenance

d. The standby equipment and standby power supply.

e. The proposed locations of concrete batch plant, including aggregate stockpiles and washdown area, points of treatment equipment, flow equalization tanks and discharge of treated water.

f. Location and size of sumps, and water discharge pipes, including their relation to swales, sediment traps, and stormwater outfalls.

g. Discharge details, metering, and reading schedules.

h. The details of the settling tank(s), treatment chemical storage tanks (if any), and oil/water separator(s).

i. Water Sampling and Analysis Plan (WSAP): The Water Sampling and Analysis Plan shall include descriptions of sampling methods, storage of treatment system effluent and laboratory qualifications

2. As-built Submittals: During installation of the water treatment system and prior to the start of treatment operation, submit as-built conditions of the water treatment system. As-built data shall include but not be limited to:

   a. Plans and sections showing as-built locations, dimensions and surveyed elevations of the water treatment system and its components.

   b. Drawings to indicate changes made to the original Working Drawings to accommodate field conditions and to comply with design standards.

3. The Contractor shall be responsible for compliance with all effluent discharge permit requirements once construction begins.

4. The following information for the Contractor or subcontractor's personnel specializing in water treatment systems similar to that required by this specification.

   a. Names and titles

   b. Resume

   c. Responsibilities

   d. Qualifications

5. The following information for the water treatment system Design Engineer:

   a. Names and titles

   b. Resume

   c. Responsibilities

   d. Qualifications

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Settling Tank:

1. Adler Tank Rentals
2. Rain for Rent
3. or approved equal

2.02 MATERIALS / EQUIPMENT

A. Materials and equipment used in the water treatment system shall adhere to accepted industry standards and be in good operating condition and able to perform satisfactorily over the required duration of construction.

B. Back up equipment for the water treatment system shall be identical to the primary equipment and shall be available in operating condition at all times.

C. Concrete washout containment may be accomplished through the use of trap system lined with impermeable plastic sheeting, geomembranes or clay liner, sealed plastic or plastic lined washout boxes, or approved equal means of containment by the Engineer. Containment area shall have berms or side-walls of sufficient height to prevent discharge to ground surface, surface water bodies, or storm drainage network on site.

D. The Concrete Washout Treatment System may use settling basins or lagoons lined with impermeable plastic sheeting, geomembranes or clay liner; drums; manufactured settling tanks defined below, or approved equal means of storage by the Engineer to contain and treat the flow outlined in Section 1.05B. The Concrete Washout Treatment System shall not be used as the Construction Wastewater Treatment System.

E. The Construction Wastewater Treatment System may use unlined settling basins or lagoons; settling basins or lagoons lined with impermeable plastic sheeting, geomembranes or clay liner; drums; manufactured settling tanks and oil/water separators defined below, or approved equal means of storage by the Engineer to contain and treat the flow outlined in Section 1.05.C. The Construction Wastewater Treatment System shall not be used as the Concrete Washout Treatment System.

F. The Contractor shall provide appropriately sized settling tanks to collect, treat, and store construction water commensurate with discharge rates to allow for settlement of suspended solids and sampling as required by disposal/discharge criteria. The tanks shall be equipped with an overflow collection system to prevent accidental release of construction water.

1. The settling tank shall be an aboveground horizontal Weir Tank manufactured by Adler Tank Rentals or Rain for Rent or approved equal, and sized based upon the maximum flow rate times a 1.5 safety factor. Sizing for volume based on NYSDEC's formula of Q(gpm) x 16 = cubic feet of storage.

2. All inlet and outlet piping shall be of sufficient size and with sufficient screening to prevent clogging.

G. The Contractor shall provide appropriately sized oil/water separators to prevent discharge of hydrocarbons, grease and other floatable materials to surface water.

1. The oil/water separator shall be concrete or steel as manufactured by Highland Tank, Rain for Rent, or approved equal, and sized based upon the maximum construction water flow rate times a 1.5 safety factor.

2. All inlet and outlet piping shall be of sufficient size and with sufficient screening to prevent clogging.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. General Requirements:

1. The Contractor shall maintain a continuous and completely effective water treatment system.

2. The Contractor shall contact the City and the NYSDEC a minimum of two (2) weeks in advance of water treatment system startup.

3. The Contractor shall coordinate the operation of its water treatment system(s) with existing and proposed construction.

4. The Contractor shall be prepared to modify the water treatment system and methods as required by actual field conditions encountered during construction, at no additional cost to the City.

B. Concrete Management:

1. Concrete shall be managed in accordance with Section 31 25 10 – Dust, Soil Erosion, and Sedimentation Control.

2. Cleanup from concrete delivery and placement, including stationary equipment washout discharge, shall drain to a contained concrete washout area. All concrete equipment, including silos, hoppers, pumps, mixers, chutes, conveyors, hand tools, concrete testing equipment, and concrete trucks shall be washed in the contained Concrete Washout Area, defined in Section 2.01.

3. All water generated during the concrete drilling, hole washing, sawing, cutting, demolition or dust control from such construction activities as installation of anchor bars, foundation and concrete surface preparation for

concrete, or demolition and removals activities shall be collected, contained and treated separately from water treated by the Concrete Washout Treatment System. The exception to this shall be water from these activities that contains or comes in contact with fresh, uncured concrete, grout, or concrete-materials.

4. Treated or untreated water generated by the construction activities listed in paragraph 1.01.A may be recycled and used for concrete washout activities.

C. Regulatory Requirements:

1. The Contractor shall manage, treat, and discharge water generated during construction activities in accordance with SPDES standards set by the NYSDEC and USEPA 40 CFR Part 450 for discharge to surface water, groundwater, or provide lawful off-site disposal.

2. The Contractor shall prepare, obtain and pay for all permits, permit modifications, applications and licenses required by law that are associated with the discharge to surface water or groundwater and disposal of effluent, including NYSDEC SPDES Permit, if applicable.

3. In no case shall water discharged from the water treatment systems or construction activities be discharged to Schoharie Reservoir. Concrete Washout Wastewater, or any construction wastewater containing fresh concrete including concrete washout and grout, or wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials may not be discharged to Schoharie Creek, Schoharie Reservoir, or to any on-site streams and shall be removed from the site for offsite disposal at a permitted facility in accordance with latest applicable NYCDEP, Federal, State and local regulations.

4. The Contractor shall provide treatment or retreatment for, or remove from the site to an approved disposal facility, all water treatment system effluent that exceeds any SPDES permit limit set for discharge to surface water. Classification and disposal shall conform to Sections 02 24 20 requirements for manifests and material transport and disposal. No separate payment will be made for treatment or disposal of such effluent.

5. All water discharged from the treatment system shall meet the effluent quality standards contained in Section 31 25 10 and the SPDES permit. The Contractor is responsible for continuously visually inspecting the treatment system discharge in accordance with Section 3.03 – Monitoring and Disposal of Effluent.

D. Inspection and Maintenance:

1. Inspection of the settling tanks and oil water shall be carried out daily to ensure that tank integrity is being maintained, and that all valves or tank openings are properly locked out to avoid accidental discharge.

2. Settling tanks and oil/water separators shall be cleaned frequently to prevent excess deposition of solids, which could overflow from the tank. A suggested sediment cleanout depth is 6 inches.

3. Removed solids shall be classified and disposed of in accordance with Sections 02 24 20 requirements for manifests and material transport and disposal.

4. Uncontaminated solids not containing uncured concrete shall be disposed of at an approved off-site facility legally authorized to receive such waste.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. The Contractor shall monitor and sample construction wastewater to determine its untreated characteristics to evaluate system performance and modify treatment system as necessary.

B. The Contractor is responsible for monitoring discharge from the water treatment system to determine if the SPDES permit requirements are being met.

C. Contractor shall monitor each water treatment system's discharge effluent and receiving water body. Discharges shall not cause substantial visible contrast to the natural condition in any receiving water body. A meter that records turbidity and pH in standard units (e.g. NTUs) shall be utilized to establish ambient conditions at each outfall prior to discharge. If any monitored turbidity level exceeds three times the ambient level of the receiving water body, the Contractor shall ensure (e.g., by reducing the flow rate or otherwise adjusting the water treatment system) that no substantial visible contrast to the natural condition in the receiving water body occurs. Acceptable pH levels of the effluent are no less than 6 and no greater than 9.

D. Any visible contrast in turbidity of the treatment system discharge and the receiving water body or reading outside the acceptable pH range, shall be immediately reported to the Engineer and discharge to Schoharie Creek shall be terminated.

E. Total Site Disturbance in excess of 10 acres Condition: The Contractor shall comply with 40 CFR Part 450. The rule is subject to change but currently written to require the following: Commencing August 1, 2011, all discharges from the site shall be tested for turbidity and the maximum daily average turbidity for each discharge from the site shall not exceed 280 NTU when the total site disturbance is 20 acres or greater. Commencing February 2, 2014, all discharges from the site shall be tested for turbidity and the maximum daily average turbidity at each discharge from the site shall not exceed a limit of 280 NTU when the total site disturbance is 10 acres or greater. Total site disturbance shall be taken to mean the combined disturbance from Contracts CAT-212B and future Contract CAT-212C. The aforementioned turbidity limits shall not be applicable for discharges in any day resulting from a storm event(s) exceeding the 2-year, 24-hour storm on that same day; however, monitoring of the turbidity levels must be performed regardless

of the size of the storm event resulting in discharge from the site. The 2-year, 24-hour storm for the site will be considered to be 3 inches.

During the periods when the aforementioned turbidity limit is in effect, the lower, more conservative turbidity limit between Section 3.04.A and 3.04.C shall be used.

F. The treatment operation shall be modified immediately if there is visible turbidity in the receiving water body, or an exceedance of the turbidity limit discussed in Section 3.04.C, when applicable, or pH outside the acceptable limits. The Contractor shall be required to store water in on-site water tight containers while modifications are being made to the treatment system. If there is not sufficient storage volume on-site, the Contractor shall haul water off site for disposal. Provide the Engineer with disposal documentation. The Contractor shall not be entitled to any additional compensation or contract time for this work.

G. The turbidity and pH level noted, action(s) taken, or the decision not to take any action, the time of discovery, and the time of action shall be recorded in the monitor's log.

H. If treatment other than settling tanks and oil/water separators is required, the Contractor shall continue to collect effluent samples during operations, and analyze for all parameters listed in the SPDES permit at intervals based on discharge volume as a verification of discharge compliance. Intervals will be as defined in the SPDES permit. A copy of all analytical results shall be submitted to the Engineer for review and approval, no later than one day after receipt of such data. The Contractor shall provide for prompt sampling and turn-around times so as not to delay the Project, but in no case shall turn-around time be longer than five calendar days.

I. If treatment other than oil/water separators and settling tanks is necessary, treatment train effluent must be held in settling tanks until analytical sample results verifying compliance with all criteria specified in the SPDES permit are met. Once approval is received, the Contractor may discharge effluent via gravity flow at allowable discharge rates.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All portions of the water treatment system shall be removed by the Contractor immediately after completion of activities requiring treatment and all construction wastewater has been successfully treated.

END OF SECTION

NO TEXT ON THIS PAGE

THE CITY OF NEW YORK

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Invitation for Bids for Furnishing all Labor and Material Necessary and Required for:

CAT-475
High Level Outlet (HLO) Installation at Gilboa Dam and Crest Gate Removal

Volume 2 of 2
Contract Terms and Specifications
(with separate Bid Booklet)

July 2026