

THE PARTIAL
RECONSTRUCTION AND
EXPANSION OF LIGHTHOUSE
PARK

BID DOCUMENTS
PROJECT SPECIFICATION BOOK



Prepared for:
ROOSEVELT ISLAND OPERATING CORP.
591 Main street
New York, NY 10044

Prepared by:
Stantec Consulting Services, Inc.

May 12, 2021

TECHNICAL SPECIFICATIONS FOR CONSTRUCTION OF THE PARTIAL RECONSTRUCTION AND EXPANSION OF LIGHTHOUSE PARK

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DETACH AND USE THIS FORM

BID FORM FOR:

ROOSEVELT ISLAND
OPERATING CORPORATION
591 MAIN STREET
ROOSEVELT ISLAND, NEW YORK 10044

THIS IS AN 11 PAGE BID FORM. ALL PAGES MUST BE COMPLETED.

THE ROOSEVELT ISLAND OPERATING CORPORATION (RIOC) RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS. EACH BID FORM SHALL BE ACCOMPANIED BY BID SECURITY IN THE AMOUNT STATED IN THE ADVERTISEMENT FOR BIDS.

The Undersigned agrees that if this bid is accepted by the State he/she will submit executed copies of the Agreement within 5 days of receipt of a written request.

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his/her knowledge and belief:

(1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition as to any matter relating to such prices with any other bidder or with any competitor;

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(4) This contract shall not cause or result in a violation of Section 73(4) of the Public Officers Law which states: "No officer or employee of a state agency, member of the legislature or legislative employee or firm or association of which such person is a member, or corporation, ten per centum or more of the stock of which is owned or controlled directly or indirectly by such person, shall sell any goods or services having a value in excess of twenty-five dollars to any state agency unless pursuant to an award or contract let after public notice and competitive bidding."

(5) This contract shall not cause or result in a violation of Section 74(3)(e) of the Public Officers Law which states: "No officer or employee of a state agency, member of the legislature or legislative employee should engage in any transaction as representative or agent of the State with any business entity in which he has a direct or indirect financial interest that might reasonably tend to conflict with the proper discharge of his official duties."

(6) The bidder recognizes New York State Finance Law §139-j and §139-k and understands and agrees to comply with all of its requirements and procedures.

(7) The bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of section 165-a of the state finance law (NYS Iran Divestment Act of 2012). The list can be viewed at the following link:

<http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf>.

(8) Will New York State business be used in the performance of this contract: Yes ☐ No ☐ (refer to Document 007324).

(9) Bidders can demonstrate their commitment to the use of Service-Disabled Veteran-Owned Businesses (SDVOB's) by responding to the questions shown below (refer to Document 007327):

a. Are you a bidder/proposer that is a NYS-certified SDVOB? Yes ☐ No ☐

b. If yes, what is your DSDVBD Control #? _____

c. Will NYS-certified SDVOBs be used in the performance of this contract? Yes ☐ No ☐

Addenda, if any, to the Contract Documents will be provided by RIOOC.

The Undersigned acknowledges receipt and review of all Addenda to the Contract Documents on the above website, listed by number in the space below:

The Undersigned proposes to perform the Work required for this project in accordance with the Contract Documents for the following amount:

TOTAL BID

REPLACE * WITH AMOUNT.

Unit Price Schedule Total (from appended Unit Price Schedule) \$ _____ *.00

SIGN BID HERE _____
Authorized Signature

PRINT NAME OF SIGNER _____

TITLE OF SIGNER _____

OFFICIAL COMPANY NAME _____

MAILING ADDRESS _____
Street

City State Zip Code

TELEPHONE NO. _____ FAX NO. _____
Area Code Area Code

E-MAIL ADDRESS _____

UNIT PRICE SCHEDULE FOLLOWS

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
GENERAL CONDITIONS		
Schedule A1 Section 15	TEMPORARY UTILITIES (Temporary Utilities) For \$ Per (Unit)	\$
Schedule A1 Section 15	OFFICE AND STORAGE SPACE (Construction Facilities) For \$ Per (Unit)	\$
Schedule A1 Section 15	FIELD OFFICE EXPENSE (Construction Facilities) For \$ Per (Unit)	\$
GENERAL REQUIREMENTS		
014010	CONSULTANT ARBORIST For \$ Per (Unit)	\$
015300	ROADS AND SIDEWALKS (Vehicular Access and Parking) For \$ Per (Unit)	\$
015626	CONSTRUCTION FENCE For \$ Per (Unit)	\$
015813	TEMPORARY PROJECT SIGNS (Project Identification) For \$ Per (Unit)	\$
EXISTING CONDITIONS		
020222	DEMOLISH, REMOVE PAVEMENT AND CURB (Demolition) For \$ Per (Unit)	\$
020222	MINOR SITE DEMOLITION (Demolition) For \$ Per (Unit)	\$
020223	TREE AND STUMP REMOVAL For \$ Per (Unit)	\$

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
023313	UNDERGROUND UTILITY LOCATOR SERVICE For \$ Per (Unit)	\$
CONCRETE		
03300	CONCRETE IN PLACE (Cast-in-Place Concrete) For \$ Per (Unit)	\$
MASONRY		
040513	MORTAR AND GROUT For \$ Per (Unit)	\$
OPENINGS		
087100	REPLACE METAL FIRE DOORS (Metal Doors) For \$ Per (Unit)	\$
087100	HARDWARE (Door Hardware) For \$ Per (Unit)	\$
FINISHES		
099200	WALLS, MASONRY (CMU), EXTERIOR (Painting) For \$ Per (Unit)	\$
099200	FLOORS, INTERIOR (Painting) For \$ Per (Unit)	\$
099200	WALLS AND CEILINGS, INTERIOR (Painting) For \$ Per (Unit)	\$
099200	BREATHABLE MASONRY COATING For \$ Per (Unit)	\$
SPECIALTIES		
101423	SIGNS For \$ Per (Unit)	\$
SITE FURNISHINGS		

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
129310	BENCH TYPE A (Site Furnishings) For \$ Per (Unit)	\$
129310	BENCH TYPE B (Site Furnishings) For \$ Per (Unit)	\$
129310	LOUNGE CHAIR (Site Furnishings) For \$ Per (Unit)	\$
129310	PICNIC TABLE (Site Furnishings) For \$ Per (Unit)	\$
129310	PICNIC TABLE ADA COMPLIANT (Site Furnishings) For \$ Per (Unit)	\$
129310	WASTE RECEPTACLES (Site Furnishings) For \$ Per (Unit)	\$
129310	PET WASTE STATION (Site Furnishings) For \$ Per (Unit)	\$
129310	DRINKING FOUNTAIN WITH HANDWASHING STATION (Site Furnishings) For \$ Per (Unit)	\$
129310	PET FOUNTAIN (Site Furnishings) For \$ Per (Unit)	\$
129310	BICYCLE RACKS (Site Furnishings) For \$ Per (Unit)	\$
129310	HOT-COAL BIN (Site Furnishings) For \$ Per (Unit)	\$
129310	BBQ GRILL (Site Furnishings) For \$ Per (Unit)	\$
129310	WELCOME SIGN (Site Furnishings)	

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
	For \$ Per (Unit)	\$
129310	DOG PARK AGILITY (Site Furnishings)	
	For \$ Per (Unit)	\$
ELECTRICAL		
2605000	WIRE (Common Work Results For Electrical)	
	For \$ Per (Unit)	\$
2605000	GROUNDING (Common Work Results For Electrical)	
	For \$ Per (Unit)	\$
2605000	PULL BOXES (Common Work Results For Electrical)	
	For \$ Per (Unit)	\$
2605000	CONDUIT IN CONCRETE SLAB (Common Work Results For Electrical)	
	For \$ Per (Unit)	\$
E-SERIES DWGS	SWITCHGEAR (Medium-Voltage Switchgear)	
	For \$ Per (Unit)	\$
E-SERIES DWGS	INTERIOR LED FIXTURES (Interior Lighting)	
	For \$ Per ***	
E-SERIES DWGS	LIGHTING POLES (Exterior Lighting)	
	For \$ Per (Unit)	\$
E-SERIES DWGS	EXTERIOR FIXTURES (Exterior Lighting)	
	For \$ Per (Unit)	\$
E-SERIES DWGS	EXTERIOR LED FIXTURES (Exterior Lighting)	
	For \$ Per (Unit)	\$
EARTHWORK		
	PREPATORY TREE PRUNING	

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
311310	For \$ Per (Unit)	\$
311311	DECOMPACT TREE For \$ Per (Unit)	\$
311312	PREPATORY FERTILIZE EXISTING TREE For \$ Per (Unit)	\$
311314	PROTECT EXISTING TREE ROOTS-WOOD CHIPS For \$ Per (Unit)	\$
311315	TEMPORARY WOOD TREE GUARD For \$ Per (Unit)	\$
311315	TEMPORARY RANGE FENCE TREE PROTECTION For \$ Per (Unit)	\$
312200	GRADING, FILLING AND COMPACTION For \$ Per (Unit)	\$
312300	EARTHWORK, UNCLASSIFIED EXCAVATION For \$ Per (Unit)	\$
312310	HAND-PNEUMATIC EXCAVATION For \$ Per (Unit)	\$
312319	DEWATERING For \$ Per (Unit)	\$
312323	BORROW FILL For \$ Per (Unit)	\$
312333	EXCAVATING. BACKFILLING AND COMPACTION FOR PIPES AND UTILITY TRENCHES For \$ Per (Unit)	\$
312513	EROSION AND SEDIMENT CONTROL For \$ Per (Unit)	\$

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
313219	GEOTEXTILE FOR DRAINAGE For \$ Per (Unit)	\$
314133	SHEETING FOR UTILITY TRENCHES For \$ Per (Unit)	\$
EXTERIOR IMPROVEMENTS		
321216	ASPHALTIC CONCRETE PAVING For \$ Per (Unit)	\$
321300	CONCRETE PAVEMENT For \$ Per (Unit)	\$
321300	INTEGRAL COLOR CONCRETE PAVEMENT For \$ Per (Unit)	\$
321300	TACTILE WARNING SURFACING (Paving Specialties) For \$ Per (Unit)	\$
321613	CONCRETE CURBS For \$ Per (Unit)	\$
321713	PRECAST CONCRETE PARKING BUMPERS (Paving Specialties) For \$ Per (Unit)	\$
321723	PAINTED PAVEMENT MARKINGS (Paving Specialties) For \$ Per (Unit)	\$
321723	PAVEMENT PARKING MARKINGS (Paving Specialties) For \$ Per (Unit)	\$
323113	CHAIN LINK GATES AND FENCES For \$ Per (Unit)	\$
329120	PLANTING BEDS For \$ Per (Unit)	\$

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
329120	TOPSOIL PLACEMENT AND GRADING For \$ Per (Unit) CY	\$
329120	BRIDGING SOIL LAYER For \$ Per (Unit) CY	\$
329219	SEEDING (LAWN) For \$ Per (Unit)	\$
329219	SEEDING (RAIN GARDEN) For \$ Per (Unit)	\$
329219	ROLLED EROSION CONTROL MATS AND BLANKET For \$ Per (Unit)	\$
329301	MULCH (Planting and Seeding Preparation) For \$ Per (Unit)	\$
329301	GROUND COVER AND VINES (Plants) For \$ Per (Unit)	\$
329301	PERENNIALS (Plants) For \$ Per (Unit)	\$
329301	SHRUBS (Plants) For \$ Per (Unit)	\$
329301	MAINTENANCE AND ESTBLISHMENT OF PLANTS For \$ Per ***	\$
329301	TREES (Plants) For \$ Per ***	\$
329301	TREE GUYING SYSTEMS (Planting Accessories) For \$ Per (Unit)	\$
UTILITIES		
	MAINTAINING AND PROTECTING EXISTING UTILITIES	

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
330100	For \$ Per Each	\$
330132	TERMINATE AND DEMOLISH EXISTING UTILITIES For \$ Per Each	\$
330132	SELECTIVE DEMOLITION, WATER & SEWER PIPING AND FITTINGS For \$ Per (Unit)	\$
330810	CLEANING AND DISINFECTING WATER MAINS For \$ Per (Unit)	\$
331110	CEMENT LINED DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS For \$ Per (Unit)	\$
331116	INSTALLATION OF WATER MAINS AND APPURENANCES For \$ Per (Unit)	\$
331117	FILTER FABIC FOR UTILITIES For \$ Per (Unit)	\$
331213	WET AND DRY CONNECTIONS TO EXISTING WATER MAINS For \$ Per (Unit)	\$
331216	WATER MAIN VALVES For \$ Per (Unit)	\$
331218	RPZ AND WATER METER For \$ Per (Unit)	\$
331220	TYPE K COPPER TUBING For \$ Per (Unit)	\$
331226	FIRE HYDRANTS WITH FENDER For \$ Per (Unit)	\$

UNIT PRICE SCHEDULE		
SPECIFICATION SECTION NUMBER	ESTIMATED QUANTITY OF EACH ITEM OF WORK (Enter Unit Bid Price in Numerals)	AMOUNT BID*
331226	GROUND HYDRANTS – 1IN DIA. For \$ Per (Unit)	\$
331443	BOOSTER PUMP STATION For \$ Per (Unit)	\$
334000	PRECAST CONCRETE DRAIN STRUCTURES For \$ Per (Unit)	\$
334100	DIP FOR SEWERS For \$ Per (Unit)	\$
334101	FLEXIBLE PIPE CONNECTORS FOR STORM SYSTEM For \$ Per (Unit)	\$
334400	CATCH BASIN CONNECTIONS For \$ Per (Unit)	\$
334413	DRAIN BASIN WITH DOME GRATE For \$ Per (Unit)	\$
334900	STRUCUTRES FOR STORM SEWERS For \$ Per (Unit)	\$
334910	DEP CAST IRON COVERS For \$ Per (Unit)	
340113	MAINTENANCE AND PROTECTION OF TRAFFIC For \$ Per (Unit)	\$
ALTERNATES		
Add Alternate #1	Shade Structure A – Structure, footings, lighting	\$
Add Alternate #2	Shade Structure B – Structure, footings, lighting	\$
Add Alternate #3	Shade Structure C – Structure, footings, lighting	\$

*Amount Bid = Estimated Quantity X Unit Bid Price

SECTION 01 00 00
GENERAL NOTES

PART 1 – GENERAL

1.1 GENERAL NOTES

- A. The Contractor is advised that additional “Notes” will be found on the drawings. Such “Notes”, while pertaining to the specific sheets they are placed on, also supplement the General Notes listed herein.
- B. The Contractor shall protect their workers at all times in conformance with applicable OSHA regulations.
- C. Whenever items in the Contract require materials to be removed and disposed, the cost of using an approved disposal area and transportation to the area shall be included.
- D. The Contractor is to visit the site before bidding to become familiar with the field conditions and to judge the extent and nature of the work to be done under the Contract. No extra compensation will be allowed to the Contractor because of the Contractor's failure to include in his/her bid all items and materials the Contractor is required to furnish in accordance with the Contract Documents. The Contractor must have in his/her possession a set of project plans and specifications for identification purposes when visiting the site.
- E. All dimensions and existing conditions shall be field verified by the Contractor.
- F. RIOC'S Representative will determine the location of the Contractor staging area based on available space and ongoing operations.
- G. The Contractor shall be responsible for restoring the site to its original condition unless indicated otherwise.

1.2 CODE COMPLIANCE AND STANDARDS

- A. The Contractor shall comply with all applicable laws which pertain to the work to be done. The Contractor shall also comply with RIOC's instructions and regulations.
- B. RIOC's Representative or Contractor shall obtain, maintain and pay for all permits, fees and licenses legally required and shall give all notices, and comply with all laws, rules and regulations applicable to the work.
- C. Where provisions of the pertinent codes, standards, regulations or Contract Documents conflict, the most stringent provision shall govern.

1.3 MATERIALS AND LABOR

- A. All materials, equipment and articles used permanently in the work which become the property of the City shall be new unless specifically stated otherwise.
- B. Whenever any product is specified by the name, trade name, make or catalog number or any manufacturer or supplier, the intent is not to limit competition but to establish a standard of quality has determined is necessary. The words “or equal” shall be deemed inserted in each instance. The Contractor may use any product equal to that named in the Contract Documents which is approved by the Engineer or Landscape Architect and which meets the requirements of the Contract Documents, providing the Contractor gives timely notice of his/her intent in accordance

with the submittal and scheduling requirements.

- C. The Contractor shall have the burden of proving at their own cost and expense to the satisfaction of the Engineer or Landscape Architect that the proposed product is equal to the named product. The Engineer or Landscape Architect may establish criteria for product approval. The Engineer or Landscape Architect shall determine in his/her absolute discretion whether a proposed product is to be approved.
- D. If the Contractor fails to comply with these provisions, or if the Engineer or Landscape Architect determines that the proposed product is not equal to that named, the Contractor shall supply the product named.
- E. The Contractor shall have and make no claim for the extension of time or for damages because the Engineer or Landscape Architect requires a reasonable period of time to consider a product proposed by the Contractor or because the Engineer or Landscape Architect disapproves such a product.
- F. Where optional materials or methods are specified, or where "or equal" submissions are approved, the Contractor shall make all adjustments to contingent work necessary to accommodate the option he/she selects.
- G. Royalties and Patents: The Contractor shall pay all royalties and license fees. He/She shall defend all suits or claims for infringement of any patent rights and shall save the City harmless from loss on account thereof, except that the City shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified.

1.4 TOPOGRAPHIC SURVEY AND UTILITIES

- A. The location, nature, and alignment of underground utilities are based on utility evidence visible at the ground surface and/or the utility plate map references indicated on the survey and are considered to be schematic only.
- B. Survey information does not claim to show all underground utilities, others may exist in the work area. Identification of all utilities within the work area shall be the sole responsibility of the Contractor.
- C. The Contractor and subcontractors are directed to contact "**DIG SAFELY NEW YORK**" by calling 811 prior to starting work.
- D. The Contractor shall protect overhead and underground utilities to prevent damage or interruption of services. The Engineer and utility owner shall be notified if utility is disturbed. The cost of the cutting and restoring service or repair of any damage shall be borne by the Contractor.

1.5 STAGING AREA

- A. The Contractor shall limit the staging of materials to the work limits as directed by RIOC's Representative.

1.6 WORK ZONE TRAFFIC CONTROL

- A. Work Zone Traffic Control (WZTC) shall be complied with throughout the length and duration of the Contract in accordance with the "Manual on Uniform Traffic Control Devices" and the Contract Documents.
- B. The cost of furnishing and installing all WZTC signs shall be included.

- C. **Protection of the Public:** The Contractor shall maintain and protect City traffic in accordance with the NYSDOT's Standard Specifications (dated May 1, 2008) Section 619, the traffic control sheets and pertinent provisions of the Manual on Uniform Traffic Control Devices. The Contractor's attention is directed to the requirements of Section 107, legal relations and responsibility to the public, of the NYSDOT's Standard Specifications dated May 1, 2008 including current additions and modifications.

1.7 COORDINATION

- A.
- B. RIOC's Representative shall schedule construction operations in the sequence best suited to accomplish the work especially where one part depends on the installation of the other.

1.8 REMOVAL AND EXCAVATION NOTES

- A. The Contractor shall provide all temporary supports, bracing and other devices required or directed by the Engineer to protect the safety of the adjacent structures, roadways and utilities.
- B. The Contractor shall saw cut (straight line cuts) and remove existing asphalt concrete pavement and concrete where required for the installation of new work. Pavement and concrete shall be replaced in kind unless otherwise noted.

1.9 SHOP DRAWINGS AND SAMPLES

- A. Shop drawings include, but are not necessarily limited to, drawings, diagrams, illustrations, schedules, test data, performance charts, catalog cuts, brochures, manufacturer's product data, installation instructions, certifications, material safety data sheet (MSDS), sample product warranties, special warranties, maintenance data, color samples, and material samples, etc. These data will be prepared by the Contractor, subcontractor, manufacturer, supplier or distributor and submitted by the Contractor for approval by the Engineer or Landscape Architect.
- B. Samples are small physical pieces of actual materials submitted by the Contractor for review and approval by the Engineer or Landscape Architect.
- C. The Contractor and the Engineer shall adhere to the submittal and scheduling requirements for shop drawings and samples as coordinated with RIOC's Representative.
- D. RIOC's Representative shall review shop drawing and sample submittals, to the extent of their ability, for Contract compliance before forwarding to the Engineer or Landscape Architect.
- E. By approving and submitting shop drawings and samples, the Contractor represents that he/she has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that he/she has checked and coordinated each shop drawing and sample with the requirements of the Contract Documents.
- F. The Engineer's or Landscape Architect's approval of shop drawings and samples shall not relieve the Contractor of responsibility for any deviation from the requirement of the Contract Documents unless the Contractor has informed the Engineer or Landscape Architect of the deviation in a separate writing at the time of submission and received written approval of the specific deviations. The Engineer's or Landscape Architect's approval shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings or samples.
- G. No portion of the work requiring a shop drawing or sample submission shall be commenced until the appropriate submission has been approved by the Engineer or Landscape Architect.
- H. Any portion of the work requiring shop drawings and samples shall be installed in accordance

with the approved shop drawings and samples.

- I. **Substitutions:** Defined as changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by the Contractor. Substitutions will not be considered during the bidding phase, but only after the project is awarded. Note, any product identified in the specifications with verbiage “**NO SUBSTITUTION ALLOWED**” means that this specific product is the standard of quality set by the City and as such “**OR EQUAL**” does not apply.

1.10 DESIGNER OBSERVATION FOR CONFORMANCE

- A. RIOC’s Representative shall keep the Engineer informed of the progress of the work and the Engineer and/or Landscape Architect will make periodic observations at the site to ensure conformance with design intent.

1.11 PROTECTING INSTALLED CONSTRUCTION

- A. Any installed component / system that is damaged, including but not limited to accidents or misuse resulting in structural damages and/or scratches, dents, cracks, abrasions etc., shall be repaired back to “like new condition”, otherwise the same component shall be replaced with a new component prior to “Final Acceptance” to the satisfaction of RIOC and at no additional cost to RIOC. This applies to all installed construction, including general, structural, landscape, furnishings, utility and electrical devices, equipment and systems, regardless of acceptance for use for and/or during Construction.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section describes the changes to be made under each alternate.
- B. Coordinate pertinent related Work and modify surrounding Work as required to complete the project under each alternate selected by the Director.
- C. Include in the Base Bid the cost of all Work required by the Contract Documents except the additional cost (if any) of the alternates described below.

1.02 DESCRIPTION OF ALTERNATES

- A. Construction Work Contract:
 - 1. Alternate No. 1: Shade Structure A – Structure, footings, lighting
 - a. Refer to Drawing E-503; E-506; 13/E-507; 2/A-101; S-Series
 - b. Refer to spec divisions – 03; 05; 06; 26
 - 2. Alternate No. 2: Shade Structure B – Structure, footings, lighting
 - a. Refer to Drawing 3/A-102; E-504; E-506; S-Series
 - b. Refer to spec divisions – 03; 05; 06; 26
 - 3. Alternate No. 3: Shade Structure C – Structure, footings, lighting
 - a. Refer to Drawing E-505; 4/A-102; S-Series
 - b. Refer to spec divisions – 03; 05; 06; 26

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. The Contractor shall engage the Professional Service of an experienced Commercial Photographer, as approved by RIOC, to take photographs of the site and the work being performed under this Contract, and as required for the Public Design Commission final approval. The photographs, negatives, and prints 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 locations from which the photographs are taken shall be subject to the direction and approval of the Landscape Architect, and RIOC.

1.03 SUBMITTALS

- A. Photographs/Video: Submit final photographs in accordance to 1.04 – Quality Assurance and 3.02 – Delivery of this specification.

1.04 QUALITY ASSURANCE

- A. Photographs must clearly and comprehensively show the completed project so that the Commission can confirm that a project was built as approved.
- B. The Photographs taken shall be of good quality, clarity, and be sufficient to accurately record the conditions and overall appearance existing at final completion of the work. Photographs must clearly and comprehensively show the completed project so that the Commission can confirm that a project was built as approved. All digital photographs shall be taken at a minimum resolution of 1200 dpi.

PART 2 - PRODUCTS

2.01 MATERIALS, METHODS, AND SUBMISSIONS

- A. Photographs shall be taken after final completion; at time of Final Inspection. At this Stage, the Contractor shall submit to RIOC, all of the following:
 - 1. Digital files: The photographer shall submit the digital photographs in color, .tiff format, with a minimum of 1200 dpi, on a CD-R. CD-r shall be labeled with name of park and contract number, in a color jewel case (any color acceptable). All files shall be named in sequence and with the contract number as part of the file name. An accurate time / date stamp shall appear on each photograph.

2. Prints: Prints shall be provided, 8.5" x 11", photographic or archival paper labeled on the back with the project title, view and Department of Buildings job number.
- B. A corresponding Log Sheet shall be provided and submitted with the negatives and prints, in the same format as the identification labels. A copy of the corresponding Log Sheet shall also be provided with the CD-R submitted.

PART 3. EXECUTION

3.01 COORDINATION

- A. When deemed necessary by RIOC, the Contractor shall contact the appropriate City Agency having jurisdiction over all parked vehicles which impede a full view of the area to be photographed.

3.02 DELIVERY

- A. Contractor shall deliver prints flat and related materials directly to RIOC.
- B. In addition, a copy of the cover letter shall be sent to RIOC.

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Shop Drawings.
 - 4. Product Data.
 - 5. Samples.
 - 6. Quality assurance submittals.
 - 7. Manufacturer's instructions.
 - 8. Manufacturer's certificates.

1.03 Administrative Submittals

- A. Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Permits.
 - 2. Applications for Payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of subcontractors.

1.04 Submittal Procedures

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

C. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

D. RIOC's Representative reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

E. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

1. Allow 2 weeks for initial review. Allow additional time if RIOC's Representative must delay processing to permit coordination with subsequent submittals.

2. If an intermediate submittal is necessary, process the same as the initial submittal.

3. Allow 2 weeks for reprocessing each submittal.

4. No extension of Contract Time will be authorized because of failure to transmit submittals to RIOC's Representative sufficiently in advance of the Work to permit processing.

F. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the review and approval markings and the action taken.

2. Provide separate submittals for each specification section.

3. Include the following information on the label for processing and recording action taken.

- a) Project name.

- b) Date.

- c) Name and address of RIOC's Representative.
- d) Name and address of the Contractor.
- e) Name and address of the subcontractor.
- f) Name and address of the supplier.
- g) Name of the manufacturer.
- h) Number and title of appropriate Specification Section.
- i) Drawing number and detail references, as appropriate.

G. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to RIOC's Representative electronically using Procore. RIOC's Representative will not accept submittals received from sources other than the Contractor.

- 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
- 2. If transmittal forms used by contractors are acceptable, delete both options below. Otherwise, retain 1 of 2 forms below.

H. SUBMITTAL SCHEDULE

- 1. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.
- 2. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
- 3. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 - a) Scheduled date for the first submittal.
 - b) Related Section number.
 - c) Submittal category (Shop Drawings, Product Data, Samples, etc.).
 - d) Name of the subcontractor.

- e) Description of the part of the Work covered.
- f) Scheduled date for resubmittal.
- g) Scheduled date for the final release or approval.

4. Distribution: Submit to RIOC's Representative electronically using Procore

5. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

6. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

I. SHOP DRAWINGS

1. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

2. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

- a) Dimensions.
- b) Identification of products and materials included by sheet and detail number.
- c) Compliance with specified standards.
- d) Notation of coordination requirements.
- e) Notation of dimensions established by field measurement.

3. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 36 by 48 inches (890 by 1220 mm).

4. Initial Submittal: Electronic submittals via Procore. Hard Copy Prints are not required unless specifically indicated in the technical specifications.

5. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

J. PRODUCT DATA

1. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves. Where product data must be specifically prepared because standard printing data is not suitable for use, submit as "Shop Drawings".

2. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

- a) Manufacturer's printed recommendations.
- b) Compliance with trade association standards.
- c) Compliance with recognized testing agency standards.
- d) Application of testing agency labels and seals.
- e) Notation of dimensions verified by field measurement.
- f) Notation of coordination requirements.

3. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

4. Preliminary Submittal: Submit a preliminary copy of Product Data where selection of options is required.

- a) Submittals: Submit electronically using Procore. RIOC's Representative will coordinate and return with action taken and corrections or modifications required.

- b) Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

6. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

7. Do not permit use of unmarked copies of Product Data in connection with construction.
8. Operations and maintenance data is to be submitted by the Contractor to establish non-routine or atypical operation and maintenance requirements for the material and equipment provided under the Contract. Submit 2 hard copies as well as a digital file in PDF format.
9. Maintenance information specified by equipment or material manufacturer's is to be tabulated.
10. Installation instructions and parts listings shipped with each piece of equipment are to be delivered to RIOC's Representative and Engineer.

K. SAMPLES

1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
2. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
 - a) Specification Section number and reference.
 - b) Generic description of the Sample.
 - c) Sample source.
 - d) Product name or name of the manufacturer.
 - e) Compliance with recognized standards.
 - f) Availability and delivery time.
3. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
4. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
5. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.
7. The Engineer or Landscape Architect will review and return preliminary submittals with the Engineer or Landscape Architect's notation, indicating selection and other action.
8. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 2 sets. The Engineer or Landscape Architect will return one set marked with the action taken.
9. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
10. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
11. Sample sets may be used to obtain final acceptance of the construction associated with each set.
12. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
13. Comply with submittal requirements to the fullest extent possible. Use Procore to provide a record of activity.

L. ENGINEER OR LANDSCAPE ARCHITECT'S ACTION

1. Except for submittals for the record or information, where action and return is required, the Engineer or Landscape Architect will review each submittal, mark to indicate action taken, and return promptly.
2. Compliance with specified characteristics is the Contractor's responsibility.
3. Action Stamp: The Engineer or Landscape Architect will stamp each submittal with a uniform, action stamp clearly indicating the action taken.
4. Action Taken: The Engineer or Landscape Architect will mark the stamp appropriately to indicate the action taken, as follows:
 - a) Final Unrestricted Release: When the Engineer or Landscape Architect marks a submittal "Approved," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

- b) Final-But-Restricted Release: When the Engineer or Landscape Architect marks a submittal "Furnish as Corrected" or "Approved as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
- c) Returned for Resubmittal: When the Engineer or Landscape Architect marks a submittal "Revise & Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
- d) Do not use, or allow others to use, submittals marked "Returned for Resubmittal" at the Project Site or elsewhere where Work is in progress.
- e) Rejected: When the Engineer or Landscape Architect marks a submittal "Rejected" or "Disapproved," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
- f) Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress
- g) Submit Specified Item: When the Engineer or Landscape Architect marks a submittal "Submit Specified Item," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
- h) Do not use, or allow others to use, submittals marked "Submit Specified Item" at the Project Site or elsewhere where Work is in progress.
- i) Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Engineer or Landscape Architect will return the submittal marked "Action Not Required."
- j) Unsolicited Submittals: The Engineer or Landscape Architect will return unsolicited submittals to the sender without action.

END OF SECTION

SECTION 01 33 10 RODENT EXTERMINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

Under this item, the Contractor shall secure the services of a State Certified Pest Control firm who will be responsible for visiting the site, determining the extent of work necessary and performing work including placing City-approved rodenticide baits in various formulations including containerized baiting stations placed directly in burrow; trapping and removal; exclusion using metal and cement mortar, at both the site and any and all buildings within the Contract Limit Line shown and in accordance with the plans specifications and directions of the Engineer.

The work shall include the following:

1. Placement of tamper proof bait stations fastened down, out of sight, and out of reach.
2. Installation of approved rodenticides – one application.
3. Posting of warning signs.
4. Monitoring the bait stations.
5. Removal of debris and any dead target organisms from the site.
6. Submission of the required “Deratification Certificate”, where applicable.

1.03 SUBMITTALS

Prior to the start of work the Contractor shall submit:

1. Qualification Data: Qualifications of licensed exterminator including State Certification, certification number and professional references.
2. Product Information: Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Method of Procedure: Manufacturer's recommended installation procedures which, when approved by the Owner's Representative, will become the basis for accepting or rejecting actual installation procedures used on the work.

Following completion of work the Contractor shall submit:

1. A copy of the DEC report.

1.04 QUALITY ASSURANCE

All work shall be performed in a professional manner and in accordance with Title 17 of Chapter 12 of the new York City Administrative Code (Local Law 37 of 2005) and the most recent version of Cornell University Cooperative Extension, NYS College of Agriculture and Life Sciences, Chemicals-Pesticide Program's *Pesticide Applicator Training Manual Category 7: Industrial*,

Institutional, Structural and Health, Subcategory Structural and Rodent. All work shall be performed by NYSDEC licensed persons directly employed and supervised by the Pest Control Firm. All Pest Control Firms must have in their possession or available to them by formal arrangement at the time of bidding the following materials and equipment to perform the work: current NYSDEC category 7 license, trucks, notification signage, personal safety equipment, City-approved rodenticides, current materials safety data sheets and labels, application equipment including dusters and NYSDEC record keeping forms. For further information on Local Law 37, please email LL37info@health.nyc.gov.

Qualifications of Professional Exterminator:

1. Must possess currently active certification as a "Certified Pesticide Applicator" in commercial category 7A from the NYS Department of Environmental Conservation or its equivalent in states with reciprocity with New York.
2. Must provide references certifying that the majority of the Exterminators work during the past three years has been primarily in the performance of rat control work.

PART 2 – PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 METHOD

Prior to start of construction, and following the Order to Work, upon direction of the Engineer, the Professional Exterminator is to identify active burrows, place an Agency-approved rodenticide deeply into the burrow to a minimum depth of 18" below the existing surface, tightly pack the burrow with thickly wadded newspaper and fill, and thoroughly compact the hole to meet the existing grade. Professional Exterminator is to follow the labeled directions exactly. Labels must be reread each time the rodenticide is used and precautions observed, especially application rates, to ensure the rodenticide is appropriate for the target organism, and the location baited. Baiting method is to follow all safety precautions as outlined by Cornell University Cooperative Extension's *Pesticide Applicator Training Manual Category 7; Industrial, Institutional, Structural and Health, Subcategory Structural and Rodent*.

After baiting is complete, a record must be submitted detailing essential information. A copy of the DEC report shall be provided to the Resident Engineer, who will forward a copy to Parks & Recreation, Central Forestry to be included in an Agency report. The following information must be entered:

- Caution Statement
- Name of pesticide used including name of active ingredient
- Target organism
- Amount of bait applied
- Number of burrows which received rodenticide treatment
- Physical description of method of application
- Location where bait was applied
- Method of application
- Dosage
- Antidote
- Date of application
- Signature of applicator

Warning Signs: Baited areas must then be posted with warning signs advising the public that rat bait will be placed in the area. Signs must comply with both NYC Dept. of Health Local Law 37 and NYSDEC regulations. Signs must be up 24 hours prior to application and must remain up a minimum of three days. The signs for a building are to be large (17"x 22") and clearly printed in both English and Spanish. The notification signs for the site are to be (8-1/2" x 11") cardboard posted at least twelve (12") inch above ground along the perimeter of the area to be treated. Signs for large treatment areas are to be posted every 20 feet, otherwise signs are to be posted nearest to the burrows treated. Signs are to read:

*CAUTION. RAT POISON HAS BEEN PLACED IN THIS AREA. Please watch children at play.
Please keep all dogs on leash.*

If swallowed, call a Poison Control Center immediately_____ (Phone #).

Rat Poison used:_____ (Specify Brand Name),

Visual Description:_____ (color, formulation),

EPA Registration #: _____

Active Ingredient(s): _____

Antidote: _____ (chemical name),

Date of posting: _____,

Proposed date of pesticide application _____

Alternative date #1 _____

Alternative Date #2 _____

Signs are to be securely fixed to walls, fences or posts.

Construction shall commence after removal of dead target organisms is complete, to the satisfaction of the Agency.

END OF SECTION

SECTION 01 35 43

ENVIRONMENTAL MANAGEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- B. Site earthwork is limited to site pavements and landscaping and is not associated with new building foundation construction.
- C. Work shall include characterization, handling and disposal of all excavated soil/fill, and if encountered, groundwater, during the work. Imported soil, fill, or other material shall meet the criteria outlined in this section.
- D. The Contractor shall provide all labor, materials, and equipment for performance of the Work in accordance with the contract documents. Contractor shall pay all necessary fees and permits related to the preliminary characterization, removal, handling, transportation and disposal of soil and treatment and/or disposal of water.
- E. The Contractor shall be responsible for the following general requirements:
 - 1. Obtain and post all permits as required.
 - 2. Provide, erect, and maintain all planking, scaffolding, bracing, shoring, barricades and warning signs as required to complete the Scope of Work for this project.
 - 3. Materials shall be removed from the site and disposed of in accordance with all applicable requirements.
- F. Contractor shall segregate any C&D and other materials from soil/fill. All C&D and related wastes shall be disposed in accordance with applicable local, State and Federal regulations.
- G. Contamination may be encountered during excavation activities. Immediately upon discovery of visual evidence of soil contamination, such as staining, sheen, or odor, the Contractor shall notify RIOC and RIOC's Consultant immediately. Any reporting requirements to applicable regulatory agencies shall be conducted by RIOC or RIOC's Consultant.
 - 1. Contaminated materials shall be segregated from uncontaminated materials and properly characterized for disposal in accordance with applicable local, State and Federal regulations.
- H. All hazardous materials shall be transported and disposed of in accordance with all applicable regulations, including but not limited to those under the Toxic Substances Control Act (TSCA), Resource Conservation and Recovery Act (RCRA), Hazardous Materials Transportation Act (HMTA), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
- I. RIOC or RIOC's Consultant will provide a hazardous waste generator identification number, if required.

- J. Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, treatment, discharge, and/or and disposal of C&D, soil/fill, and water. Contractor is responsible to advise RIOC or RIOC's Consultant of any conflict between applicable regulatory requirements and this specification.
- K. Contractor shall perform all work in accordance with these specifications and associated approvals/requirements of New York State Department of Environmental Conservation (NYSDEC), New York City Department of Parks and Recreation (NYC DPR) and/or NYC Department of Environmental Protection (NYCDEP) as required.
- L. Contractor shall prepare a site-specific Health and Safety Plan (HASP) and submit it for review by RIOC's Consultant prior to any excavation activities. Details on health and safety requirements are provided in Part 1.4 of this Section.
- M. Contractor shall be responsible for notifying the underground facilities protection organization for a Code 753 utility mark-out a minimum of three (3) days prior to any excavation activities. In addition, the Contractor shall confirm that all potentially affected site-specific utilities are deactivated or otherwise protected prior to any excavation.
- N. Contractor shall supply signs, barricades, fencing and any other equipment necessary for delineating and safeguarding the work zone. The Contractor must remove all temporary security equipment upon completion of the site work.
- O. Contractor must handle the excavated material in a manner to protect site personnel, the public, and the environment in accordance with all applicable regulations.
- P. Contractor must obtain acceptance of the excavated material by an appropriate waste disposal facility(s) according to applicable regulations.
- Q. Contractor must transport contaminated materials to the waste facility using a permitted waste hauler according to applicable regulations.

1.03 SUBMITTALS

- R. Initial submittals shall be provided and approved by RIOC or RIOC's Consultant
 - 1. Details of all proposed disposal facilities, including sampling requirements.
 - 2. Details of all sources of imported soil, fill, or other material, which shall be approved by RIOC and/or RIOC's Consultant.
 - 3. Submit a Statement of Qualifications for review and approval. The Statement should provide sufficient data and information to relate that the contractor is fully experienced in the removal, handling, transportation, and disposal of soil, water, and other wastes.
 - 4. The Contractor shall obtain all applicable permits before commencing any work.
 - 5. The Contractor shall prepare a site Health and Safety Plan (HASP). All Contractor site personnel will be required to read and sign the HASP.
- S. Project Submittals
 - 1. Submit Environmental Materials Management Plan to RIOC's Consultant for approval in accordance with this section. Plan shall include listing of all proposed disposal facilities and transporters, including waste characterization/acceptance criteria and permits. Plan shall also include proposed sources of imported top soil and any fill materials required for the project. Plan shall outline procedures, permits, and related requirements to manage water and associated discharge in accordance with this Section. RIOC and RIOC's Consultant shall have the right to accept or reject the use of any proposed facilities proposed by the Contractor at no additional cost to RIOC. In accordance with Plan, at least 10 days prior to

- initiation of off-site material disposal activity, submit to RIOC and his authorized representative the location for off-site material disposal and any required waste classification documentation. Upon disposal, submit documentation of final satisfactory disposal (i.e., manifests) within 30 days in accordance with Plan.
2. Submit approval from the intended disposal facility(s) that any pre-characterization sampling results meet the applicable acceptance criteria and the facility has adequate capacity to receive the waste material. Such acceptance letters shall be subject to the review and approval of RIOC's Consultant.
 3. Submit copies of permits and licenses for the Contractor's waste hauler(s) and disposal facility.
 4. Submit analytical results for any supplemental waste classification/characterization samples collected by the Contractor. Samples must be analyzed in a New York State Department of Health (NYSDOH)-certified laboratory.
- T. Post Project / Contract Closeout Submittals
1. Compilation of all completed and signed waste shipment record forms, bills of lading, manifests, and disposal receipts pertaining to this Project.
- U. Regulatory Requirements, References, and Standards: In addition to Contract Documents, work shall be accomplished in strict adherence to applicable Federal, State, and local regulations. Wherever there is a conflict or overlap of the regulatory requirements, references, standards and these specifications, the more stringent provision shall apply.
1. Before starting the work, Contractor shall examine this Specification for compliance with codes and regulations applicable to the work and immediately report any discrepancy to RIOC's Consultant at least 5 days prior to scheduled start of work.
 2. Contractor shall comply with additional requirements specified in Part 1.4 - Health and Safety below.
- V. Authority to Stop Work: Causes for suspension/stopping of work may be at any time if a determination is made that conditions are not within those set within this Specification or applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of RIOC and RIOC's Consultant. Standby time taken to resolve any problems shall be at no additional expense to RIOC.

1.04 HEALTH AND SAFETY

- W. Toxic Effects: The Contractor shall assume all responsibility for any toxic effects to workers or authorized visitors from the air supplied to respirators or from toxic or damaging vapors or residues resulting from petroleum, solvents, or other hazardous substances in soil or groundwater.
- X. Chemical Hazards: Soil and groundwater at the site may be contaminated with petroleum, solvents, or other hazardous substances. Contractor shall provide materials, equipment, and training to workers and authorized visitors to ensure their protection from these and any other hazards which may be identified during the course of this work. Workers in areas with evidence of contaminated material or known hazardous waste must have completed a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel in contaminated work zones will have up-to-date 8-hour refresher training and medical monitoring.
- Y. Physical Hazards: Contractor shall provide safety equipment and training to workers and authorized visitors to ensure their protection from any physical hazards including but not limited to trip/fall hazards, working at elevation, heat stress, contact with energized (hot) active equipment, noise, overhead bump hazards, and electrical shock that may be present during the Work.

- Z. Safety Act: The Williams-Steiger Occupational and Safety Health Act (OSHA) of 1970, as amended, shall be strictly complied with during the course of this Project. This Act shall govern the conduct of the Contractor's workers, subcontractors, and visitors to the Project site.
- AA. Accident Prevention and Reporting:
1. To protect the lives and health of workers and authorized visitors, Contractor shall comply with all pertinent provisions of the latest edition of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc.
 2. Contractor shall maintain an accurate record of all accidents that occur during the work, and shall report any injury or loss of life to RIOC's Consultant immediately.
- BB. Emergency Response: Contractor shall establish an Emergency Response Team made up of members of its work force. Team members shall be trained, organized, and capable of responding in the event of an accident, fire, or other emergency at the work site. Contractor shall designate a site Safety Coordinator to train team members regarding the location and use of site-specific fire/life safety equipment. As a minimum requirement, members of the Emergency Response Team shall be knowledgeable in standard first aid and CPR techniques, fire extinguisher use, and evacuation procedures.
- CC. Worker Protection: Contractor shall provide and maintain all safety measures necessary to properly protect workers.
- DD. Emergency Actions: In an emergency affecting the safety of life, the work, or adjoining property, the Contractor, to prevent such threatened loss or injury without special instruction or authorization from RIOC, RIOC's Consultant, Architect, or other RIOC's Consultant is hereby permitted to act at his discretion.
- EE. Hazard Communication Act: Comply with the Hazard Communication Standard promulgated by OSHA (29CFR1910.1200).
- FF. The Contractor shall prepare a site-specific HASP and implement it during any time that contaminated soil is being handled. The HASP shall include, but not be limited to, the following requirements:
1. General HASP introduction including project location, scope of work covered by HASP, names, addresses, and telephone numbers for the Contractor's project manager, the Health and Safety Officer (HSO), and emergency assistance telephone numbers;
 2. A sign-off sheet indicating acceptance by Contractor's project manager and HSO;
 3. Position description of health and safety personnel;
 4. Project description;
 5. Site map;
 6. Hazard assessment for construction workers;
 7. Training requirements;
 8. Definition and identification of work zones;
 9. Site access restrictions;
 10. Contaminant description/characterization;
 11. Personal protection equipment (PPE) requirements;
 12. Air monitoring procedures;
 13. Action levels triggering PPE upgrades, dust suppression, etc.;
 14. Decontamination and disposal procedures; and
 15. Affidavit of site workers.
- GG. Work Zones
1. Prior to commencing work, work zones should be defined by: location, type of work performed, and personnel allowed access.

2. The work zone(s) shall be delineated using safety fencing and/or other barricades according to applicable regulations. Access to the work zone(s) by unauthorized personnel shall be prohibited.

HH. Work Zone and Community Air Monitoring

1. In the event that visible contamination is encountered during earthwork activities, work should stop immediately and RIOC shall be notified. RIOC's Consultant may initiate periodic air monitoring to ensure that concentrations of organic vapors and dust do not exceed safe action levels at the perimeter of the work zone in accordance with typical OSHA Short-term Exposure Limits (STELs) and typical community air monitoring requirements. If perimeter action levels specified by RIOC's Consultant are exceeded, RIOC's Consultant will direct Contractor to implement dust suppression measures, abatement of organic vapors, and/or temporary work stoppage, as appropriate. RIOC or RIOC's Consultant will not accept any delay claims associated with conducting dust suppression or abatement of organic vapors.

II. Applicable Health and Safety Regulations/Publications

1. Occupational Safety and Health Administration (OSHA), Standards and Regulations, 29 CFR 1910 and 1926.
2. NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.
3. U.S. Department of Health and Human Services (DHHS) "NIOSH Sampling and Analytical Methods", DHHS (NIOSH) Publication 84-100.
4. ANSI, Practice for Respiratory Protection, Z88.2 (1980).
5. ANSI, Emergency Eyewash and Shower Equipment, Z41.1 (1983).
6. ANSI, Protective Footwear, Z358.1 (1981).
7. ANSI, Physical Qualifications for Respirator Use, Z88.6 (1984).
8. ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1 (1968).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Storage Containers
 1. U.S. Department of Transportation (DOT)-approved containers and drums shall be provided for storage, transportation and disposal of C&D, soil, dewatering and drilling fluids, decontamination water, used PPE, and/or used sampling equipment.
- B. Plastic Sheeting
 1. Polyethylene sheeting of 6-mil or greater thickness shall be provided for stockpiling and covering soil/fill or other waste materials.
- C. Hay Bales
 1. Hay or straw bales shall be provided for constructing berms around soil stockpiled above site grade. Silt fencing may also be used for this purpose.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 1. Contractor and, as applicable, Contractor's subcontractor for waste disposal, shall be held to have field-verified the types and quantity of wastes to be removed and shall have become

familiar with all variable field conditions existing at the Project site facility before the submission of bid(s) for the Contract work.

2. Contractor shall notify RIOC or RIOC's Consultant of excavation activities. RIOC or RIOC's Consultant shall reserve the right to field verify quantities of contaminated soil.

3.02 DESCRIPTION OF WORK

B. Excavation and Disposal of Soil and Fill

1. Contractor shall excavate and dispose of all excavated soil and fill material that cannot be reused on-site in accordance with the requirements set forth below, and in accordance with NYSDEC requirements.
2. Excavated material shall be segregated based classification of the material, which may include but not limited to, the following categories:
 - a. General fill as defined in 6 NYCRR Part 360.13(f) and associated testing results meeting the 6 NYCRR Part 375 NYSDEC Unrestricted Use (UU) Soil Cleanup Objectives (SCOs).
 - b. Non-hazardous historic fill containing volatile organic compounds (VOCs), metals, pesticides, polychlorinated biphenyls (PCBs), and/or semi-volatile organic compounds (SVOCs) exceeding 6 NYCRR Part 375 NYSDEC Unrestricted Use (UU) Soil Cleanup Objectives (SCOs).
 - c. Non-hazardous petroleum-contaminated soil.
 - d. Hazardous lead-, arsenic- and/or mercury-contaminated soil.
3. Stockpiling
 - a. Contractor shall arrange for approval from the disposal facility(s) to allow for direct loading of soil to minimize the need for staging or stockpiling of soil on-site. To the extent that staging or stockpiling of soil is necessary, procedures are outlined below.
 - b. The Contractor shall prepare an area of the site approved by RIOC (and/or NYC DPR) for stockpiling segregated soil.
 - c. The area will be prepared by placing 6-mil plastic on the ground with a straw bale barrier (or equivalent) placed around its perimeter to prevent run-off. If the material is contaminated, at the direction of RIOC's Consultant, a double layer of 6-mil plastic shall be used.
 - d. The Contractor shall stockpile the excavated soil separately from any excavated soil that is determined by RIOC's Consultant to be historic fill, petroleum-contaminated, or hazardous waste.
 - e. At the end of each workday, the Contractor shall cover all contaminated soil stockpiles with 6-mil plastic sheeting, weighted with tires or other suitable weights to maintain the cover and prevent rain and wind erosion.
4. Ground water, if encountered in the excavation, shall be dewatered in accordance with Section 312319.
5. Waste-Characterization Sampling
 - a. RIOC's Consultant performed preliminary sampling of the soil according to typical requirements of disposal facility(ies).
 - b. The Contractor shall be responsible for any additional soil sampling, as required by the disposal facility(ies) identified by the Contractor. Parameters analyzed will depend on the disposal facility requirements.
6. End Point Sampling

- a. RIOC's Consultant may be required to collect end point samples from the excavation sidewalls and bottom in accordance with NYSDEC and/or WCDOH requirements. Contractor shall assist RIOC's Consultant in collecting such samples.
 - b. Laboratory analysis of samples may require five (5) or more business days. RIOC or RIOC's Consultant will accept no delay claims associated with the sampling and testing procedures performed by RIOC's Consultant.
7. Disposal Facility and Waste Hauler
 - a. Waste classification results shall be used for acceptance of contaminated material at an approved waste disposal facility, for ensuring that the facility is properly permitted to accept the stated material, and that the facility provides the stated storage and/or disposal services.
 - b. Contractor shall obtain letters of commitment from the waste hauler and disposal facility to haul and accept shipments. The letter shall indicate agreement to handle and accept the specified estimated quantities and types of material during the time period specified in the project schedule.
 - c. Prior to the excavated material leaving the site, the waste hauler and disposal facility commitment letters will be submitted by RIOC's Consultant for approval.
 - d. In the event that the identified and approved facility ceases to accept the stated materials or the facility ceases operations, it is the Contractor's responsibility to locate an alternate approved and permitted facility for accepting materials. The Contractor is responsible for making the necessary arrangements to utilize the facility. This shall be done at no extra cost or delay to RIOC.
 - e. RIOC and RIOC's Consultant shall have the right to accept or reject the use of any specific disposal facilities proposed by contractor at no additional cost to RIOC.
8. Schedule and Notification
 - a. Contractor is responsible for notifying RIOC's Consultant at least 48 hours before the scheduled date for the off-site disposal of excavated material at the facility approved by RIOC and/or RIOC's Consultant and also approved by the actual disposal facility. RIOC's Consultant may be on-site during material removal operations.
9. Recordkeeping
 - a. Contractor shall organize and maintain the material shipment records/manifests required by the Federal Resources Conservation and Recovery Act (RCRA) (Public Law 94-580), the State of New York and the state where the disposal facility is located.
 - b. Contractor shall coordinate manifesting and placarding of shipments. All quantities shall also be measured and recorded upon arrival at the disposal facility. If any deviation between the two records occurs, the matter is to be reported immediately to RIOC or RIOC's Consultant.
 - c. RIOC will obtain an EPA hazardous waste generator identification number, if necessary.
 - d. The Contractor shall not deliver waste to any facility other than the waste disposal facility listed on the shipping manifest.
10. Truck Decontamination
 - a. The Contractor shall ensure that trucks are protected against contamination by properly covering and lining them with compatible material (such as polyethylene) or by decontaminating them prior to any use other than hauling hazardous materials.
 - b. The Contractor shall inspect all vehicles leaving the project site to ensure that contaminated soil adhering to the wheels or undercarriage is removed prior to the vehicle leaving the site.

- c. The Contractor shall be responsible for any and all action necessary to remedy situations involving material spilled in transit or mud and dust tracked off-site. This clean-up shall be accomplished at the Contractor's expense.
- 11. Vehicle Routes
 - a. The Contractor is responsible for planning vehicle routes to ensure adequate road conditions and overhead clearance, and to verify that trucks do not exceed weight restrictions.
- C. Reuse of Excavated Soil
 - 1. Excavated material may not be reused on-site without prior approval by RIOC's Consultant. If the Contractor anticipates reuse of site material, the Contractor shall notify RIOC's Consultant of the area with a minimum 2 week notice prior to reuse to allow for approval by RIOC's Consultant.
- D. Importing of Fill Material
 - 1. All backfill material shall be imported in accordance with the requirements set forth below.
 - 2. The Contractor shall provide documentation regarding the origin of the material, amount of material to be imported, address and Block/Lot identification, RIOCship and a brief history of the source site.
 - 3. Unless otherwise approved by RIOC's Consultant or NYC DPR (following written approval), Contractor shall import only soil, fill, or other material that meets one of the following criteria. If there is a conflict between applicable regulations and this Section, the more stringent criteria shall apply.
 - a. Virgin quarried material.
 - b. Material from a facility that possesses a current Beneficial Use Determination (BUD) from the NYSDEC that includes testing at a minimum frequency of one sample per 500 cubic yards and such results are below the lower of Protection of Groundwater and Restricted Residential SCOs set forth in NYSDEC 6 NYCRR Part 375. Any testing shall be conducted in accordance with this Section.
 - c. Material from any other site where testing results performed by RIOC's Consultant demonstrate that the material meets the lower of the Groundwater Protection SCOs and the Restricted Residential SCOs set forth in NYSDEC 6 NYCRR Part 375 in accordance with the following procedures:
 - 1) Contractor shall establish a designated stockpile of soil intended for import to the site for RIOC's Consultant to sample. Designated stockpile shall remain undisturbed until tested by RIOC's Consultant and loaded and transported to the site.
 - 2) The samples will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs, Pesticides and Target Analyte List (TAL) metals at a minimum sampling frequency of one (1) five-point composite sample per 500 cubic yards imported to the site.
 - 3) Laboratory analysis and approval of samples may require five (5) to ten (10) business days. RIOC or RIOC's Consultant will accept no delay claims associated with the sampling, testing and approval procedures performed by RIOC's Consultant.
 - 4) Contractor shall reimburse RIOC for any costs associated with resampling of soil that fails the criteria set forth above (the lower of the Groundwater Protection and Restricted Residential SCOs).
 - 5) Material may not be imported for use as backfill without prior testing and approval by RIOC's Consultant.
 - d. Contractor shall comply with City of White Plains requirements for imported materials.

4. RIOC and RIOC's Consultant shall have the right to accept or reject the use of any specific source of imported material proposed by Contractor at no additional cost to RIOC.
5. Schedule and Notification
 - a. Contractor is responsible for notifying RIOC's Consultant at least two weeks before the scheduled date for importing material to review the source, associated documentation, and conduct sampling, if necessary in accordance with the Environmental Materials Management Plan. RIOC's Consultant may be on-site when importing material to the site.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Engineer, RIOC, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Integrated Exterior Mockups: Mockups of the exterior elements constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by RIOC's Representative.

1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to RIOC's Representative.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent

requirement. Refer conflicting requirements that are different, but apparently equal, to the Engineer for direction before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the Engineer for a decision before proceeding.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior and laboratory mockups.
 - 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.

6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For RIOC's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.

2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens and test assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Engineer or Construction Manager.
 3. Notify Engineer and Construction Manager ten (10) business days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Engineer's and Construction Manager's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow ten (10) business days for initial review and each re-review of each mockup.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 8. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to Shop Drawings and/or Contract Documents. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 40 10

CONSULTANT ARBORIST

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Under this Item, the Contractor shall engage the services of a Consultant Arborist who shall serve as the liaison between RIOC, RIOC's Representative, and the Contractor. The Consulting Arborist (CA) will direct the contractor's excavation work around existing trees under all stages of work, and supervise tree pruning, care, protection, and removal operations. The CA shall represent RIOC's interests in adherence to the Agency's standards and requirements for tree care, protection, and preservation.
- B. The Consultant Arborist shall be a professional forester or arborist approved the Landscape Architect and who shall advise on tree care, protection, and removal operations. The CA shall be a person independent of and not associated with those persons performing the tree pruning or tree removal operations, or any construction operations under this contract. The Landscape Architect shall review the professional credentials for approval.

1.03 QUALIFICATIONS

- A. All persons desiring approval as Consulting Arborists shall possess, for a minimum of three (3) years prior to the date of contract registration, certification from the International Society of Arboriculture (I.S.A.) as a "Certified Arborist" or "Board Certified Master Arborist," or from the American Society of Consulting Arborists (A.S.C.A) as a "Registered Consulting Arborist;"
- B. A minimum of three (3) years of full-time professional experience in the practical use of knowledge involved in tree protection, pruning, installation and establishment, diagnosis and treatment of tree problems, cabling and bracing, climbing, fertilization, or other services that directly relate to arboriculture.

1.04 SUBMITTALS

- A. Qualification Data: Names, social security numbers, title and qualifications, including resume educational background, employment history, and relevant certifications, of persons proposed to work under this item shall be submitted for review by the Landscape Architect fifteen (15) days after award. All persons submitted shall comply with the Minimum Qualifications listed above.

- B. Other: Sign-in sheets documenting amount of time spent at job site monitoring. The sign-in sheet shall, at a minimum indicate the name and title of each person working on the project, amount of time spent, and tasks performed.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION

3.01 METHOD

- A. The Consultant Arborist shall be required to appear on the work site when directed by RIOC's Representative. The Consultant Arborist shall advise on tree care, protection, and removal operations. The CA shall personally witness and direct all excavation work within the drip lines and critical zones of existing trees, approving both the Contractor's choice of tools and equipment for excavation under the appropriate Contract Specifications and his manner of work around existing trees, and recommend construction alternatives in order to avoid damage to existing trees. Where pruning of roots is proposed or deemed necessary, RIOC's Representative shall review the equipment for such pruning. The CA shall monitor the Contractor's operations to ensure roots are protected during excavation and pruning operations according to specifications.
- B. The CA shall assess any damage caused by the Contractor's vehicles, equipment, or operations, and notify RIOC's Representative immediately of any such damage.
- C. As noted on the Tree Protection Plan, the CA shall personally witness the installation of all tree protection items specified in the contract and shall advise RIOC's Representative if additions or modifications to tree protection are warranted to avoid damage to existing trees. The CA shall immediately notify RIOC's Representative if tree protection items require repair or are insufficient.
- D. As noted on the Tree Protection Plan, the CA shall personally witness tree removals, pruning, fertilization, decompaction, and other tree care operations to ensure compliance with specifications and associated ANSI standards.

- 3.02 REPORTING:** The CA shall file a weekly report with RIOC's Representative for each week or part of a week worked, no later than close of business on Tuesday of the following week. Each weekly report shall include all dialogue and actions pertaining to the supervisory capacity of the Consultant Arborist over the abovementioned operations. Each report shall include photographic documentation of any excavation within the drip lines and critical zones of existing trees, any root pruning performed, and any tree damage incurred on existing trees. RIOC shall be notified of any conflicts between the Consultant Arborist, Director's Representative, and Contractor for resolution.

END OF SECTION

**SECTION 01 41 00
REGULATORY REQUIREMENTS**

PART 1 GENERAL

1.01 COMPLIANCE

- A. Comply with applicable regulatory requirements and various codes referenced in these specifications. Where conflicts exist between local, State, and/or Federal regulatory requirements, codes, or these specifications advise RIOC's Representative. RIOC's Representative will assist in resolving the conflicts to the satisfaction of the regulatory agencies prior to commencing the Work.

1.02 CODES AND QUALIFICATIONS

- A. All Work shall comply with OSHA (site specific safety plans are required on all projects), the New York State Uniform Fire Prevention and Building Code (the "Uniform Code"), which includes the current editions of Part 1220 (Residential Code), Part 1221 (Building Code), Part 1222 (Plumbing Code), Part 1223 (Mechanical Code), Part 1224 (Fuel Gas Code), Part 1225 (Fire Code), Part 1226 (Property Maintenance Code), Part 1227 (Existing Building Code). and Part 1240 (Energy Code) and their referenced standards. The referenced codes and standards shall be the date of latest revision in effect at the time of receiving bids, unless the date is given.
1. The contractor shall be aware of, and comply with, contractor requirements identified in the above referenced codes and standards; for example, but not limited to: OSHA (Occupational Safety and Health and Health Administration) - Building Code of New York State - Chapter 33 Safeguards During Construction, Existing Building Code of New York State - Chapter 14 Construction Safeguards, Fire Code of New York State - Chapter 14 Fire Safety During Construction and Demolition, Fire Code of New York State - Chapter 26 Welding and Other Hot Work (which governs safety during construction).
- B. All Work outside City property must comply with the New York City family of codes and New York City permitting and filing requirements, however, New York City licensing requirements are required and apply to all Work for this Contract regardless of where the Work is located. Work both on and outside City property is regulated by the Department of Environmental Protection (DEP) and the Fire Department (FDNY).
- C. Electrical Work: Conform to the requirements of the Electrical Code of the City of New York.
- D. Prime Contractor and Subcontractor Qualifications: Contractors and subcontractors shall comply with the current Electrical and Plumbing licensing requirements in accordance with the General Administrative Provisions of the New York City Construction Codes. For additional information, see: http://www.nyc.gov/html/dob/html/development/licensing_main.shtml
- E. Electrical Work Contractor and Subcontractor Qualifications: The Electrical Contractor and/or all electrical subcontractors must be a "Master Electrician Business", as defined in Title 27 of the New York City Administrative Code section of the New York City Electric Code, with current registration as an 'Electrical Firm' with the New York City Department of Buildings.

1. The firm must employ a holder of an active New York City Master Electrician License, registered with the New York City Department of Buildings as the firm's "Responsible Representative", who must supervise all of firm's physical work during course of the project.
 2. Submit the New York City Electrical Firm Registration Number and the firm's Responsible Representative's current active New York City Master Electrician License Number to RIOC's Representative for approval.
- F. Fire Codes: Contractor shall meet the following additional requirements of the NYC Fire Code 2009 or other referenced requirement listed below.
1. Temporary Lighting: Chapter 14 Fire Safety During Construction, Alteration & Demolition, which states: "1404.7 Electrical: Temporary wiring for electrical power and lighting installations at construction sites shall comply with the requirements of the New York City Electrical Code".
 2. Temporary Heat: Chapter 14 Fire Safety During Construction, Alteration & Demolition,
http://www.nyc.gov/html/fdny/pdf/firecode/2009/fire_code_l126_2008_amended_l137_41_64_2009_final_complete.pdf#page=211
 3. Fire Protection and Safety:
 - a. Chapter 3 General Precautions Against Fire
 - b. Chapter 4 Emergency Planning And Preparedness
 - c. Chapter 5 Fire Operations Features
 - d. Chapter 9 Fire Protection Systems
 - e. For Items above, see:
http://www.nyc.gov/html/fdny/pdf/firecode/2009/fire_code_l126_2008_amended_l137_41_64_2009_final_complete.pdf#page=61
 4. Explosives: FDNY Bureau of Fire Prevention, FDNY Fire Code 2009:
 - a. Chapter 33 – Explosives, Fireworks, and Special Effects: For storage of combustibles see the Table of Contents and the specific requirements of the following chapters:
 - 1) Chapter 13 Combustible Dust-Producing Operations
 - 2) Chapter 23 High-Piled Combustible Storage
 - 3) Chapter 27 Hazardous Materials - General Provisions
 - 4) Chapter 29 Combustible Fibers
 - 5) For Items above, see:
http://www.nyc.gov/html/fdny/pdf/firecode/2009/fire_code_l126_2008_amended_l137_41_64_2009_final_complete.pdf

1.04 NEW YORK CITY PERMITS AND INSPECTIONS

- A. NYC Permits and Inspections are required for all Work outside City property lines including sewer, water, and sprinkler connections. Electric and gas utilities require utility inspection and compliance with their standards, rules, and regulations. Contractors shall file and pay for all required NYC Permits for all Work outside City property. Contractors shall not file or pay for permits for work on City property.
1. Permits, certificates and inspections which may be required include, but are not limited to:
 - a. Construction Permit.
 - b. Electrical Inspections.
 - c. Plumbing Inspections.
 - d. Sidewalk Bridge Permit: For sidewalk bridges and/or scaffolding, see Scaffolds and Sheds:
http://www.nyc.gov/html/dob/html/development/scaffold_shed.shtml

- e. Street Opening Permit: Sidewalks, curbs – for locations outside the boundaries of NY State property, comply with NYC DOT requirements, including:
<http://www.nyc.gov/html/dot/html/sidewalks/sidewalkintro.shtml>
- f. Sidewalk Repair Guidelines:
<http://www.nyc.gov/html/dot/downloads/pdf/instfilingplan.pdf>
- g. Curb Cuts: A curb cut is the area of a sidewalk that has been lowered, or cut down, to facilitate access to the street. If you would like DOT to consider a T-intersection for a crosswalk, call 311 or contact the appropriate DOT Borough Office. Based on the location's distance from the nearest crosswalk and pedestrian volumes, DOT will determine whether a crosswalk can be installed.
- h. Tree Removal Approval.
- i. Sewer and Water Connection permits: Work outside the NYS property line, must with the NYC DEP Cross Control Bureau requirements for RPZ, meters, valves, etc., including Water & Sewer forms. DEP is responsible for approving all work related to the City water and sewer infrastructure including construction of private water and sewer mains, connections to the water and sewer system, repair work on the system, and discharges into the sewer system. This section includes general information and detailed application requirements to assist property owners, Professional Engineers and Registered Architects, & plumbers in obtaining required approvals, permits and inspections. See:
http://www.nyc.gov/html/dep/html/forms_and_permits/water_sewer.shtml
- j. Lifting equipment: Cranes, Hoists, riggers, licenses, etc. Dept of Buildings Cranes and Derricks Unit: The Department's Cranes and Derricks Unit oversees the design, installation and safe operation of equipment used for hoisting or lifting purposes. The Cranes and Derricks Unit does not regulate equipment installed on water. Personnel and Tower Material hoists are regulated by the Elevator Division. Include Licensing and Permitting information:
http://www.nyc.gov/html/dob/html/development/crane_home.shtml
- k. Noise and Air Pollution: Noise and Air pollution Guidelines (titled as 'Guidelines', however mandatory for this contract):
<http://www.nyc.gov/html/dep/html/air/index.shtml> and
<http://www.nyc.gov/html/dep/html/noise/index.shtml>
- l. Other: NYC Certifications for welders, equipment operators, concrete foreman, site safety managers, crane operators, etc. For crane operation, refer to item no. 6 above. Additionally, a Certificate of Fitness may be required by FDNY Fire Code 2009, see:
http://www.nyc.gov/html/fdny/pdf/firecode/certificate_of_fitness.pdf
- m. Uniformed and non-uniformed members of the Fire Department of New York (FDNY) may inspect construction and demolition sites to ensure compliance with fire safety standards.

1.06 FIRE RESISTANT CONSTRUCTION MATERIALS AND ASSEMBLIES

- A. Conform to the fire rating classifications based upon the test methods and acceptance criteria in the Standard, Fire Tests of Building Construction and Materials for which Underwriters' Laboratories, Inc. (UL) provides listings.

1. Materials and assemblies shall comply with the acceptance criteria, detailed description of the assembly, its performance in the fire test and other pertinent details such as specification of materials, Classification coverage, and alternate assembly details.
2. Alternatively, fire resistance rating classifications by other issuing organizations listed in the New York State Uniform Fire Prevention and Building Code are acceptable.

1.07 UTILITIES

- A. Underground Utilities:
 1. Locate existing underground utilities prior to commencing excavation work. Conform to all requirements of NYCRR 16 Part 753, including the following:
 - a. Notify Dig Safely New York at least 48 hours in advance not counting the date of contact.
 - 1) NYC/Long Island area: 800-272-4480
 - 2) Website: www.digsafelynewyork.com
 - b. Refer to Project Manual section 023313 Underground Utility Locator Service for Work related to locating utilities on facility and/or private property.
 - c. Determine exact utility locations by hand excavated test pits. Contractor will be responsible for the proper support and protection of all utilities to remain in service.
- B. Coordination with Electric Utility Company:
 1. Comply with Con Edison Company of New York (Con Ed) or National Grid requirements for new or modified electric service. If a meter is required to complete the Work, arrange installation with the Con Ed Energy Services Department. www.coned.com/es/contacts.pdf
- C. Coordination with Gas Utility Company:
 1. Comply with Con Edison Company of New York (Con Ed) or National Grid requirements for new or modified gas service.
- D. Coordination with Municipality for Water Connection:
 1. Comply with the municipal requirements for the connection of water lines to the municipal utility services. Obtain and pay for all necessary permits from municipal water department. Obtain authority to connect to their existing water mains.
 - a. Make necessary connections to existing municipal water mains under supervision of water department's representative.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Engineer or Landscape Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer or Landscape Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Director's Representative, Engineer or Landscape Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 10. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 11. AGA - American Gas Association; www.aga.org.
 - 12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 14. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 15. AIA - American Institute of Architects (The); www.aia.org.
 - 16. AISC - American Institute of Steel Construction; www.aisc.org.
 - 17. AISI - American Iron and Steel Institute; www.steel.org.
 - 18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 20. ANSI - American National Standards Institute; www.ansi.org.
 - 21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 22. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 23. APA - Architectural Precast Association; www.archprecast.org.
 - 24. API - American Petroleum Institute; www.api.org.
 - 25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
 - 26. ARI - American Refrigeration Institute; (See AHRI).
 - 27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
 - 28. ASCE - American Society of Civil Engineers; www.asce.org.
 - 29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
 - 30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.

31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.

79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.

126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.

176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tilerroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - Western Wood Products Association; www.wwpa.org.

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE / ACOE / USACE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. CG / USCG – United States Coast Guard; www.uscg.mil.
11. HUD - Department of Housing and Urban Development; www.hud.gov.
12. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
13. OSHA - Occupational Safety & Health Administration; www.osha.gov.
14. SD - Department of State; www.state.gov.

15. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
 16. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 17. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 18. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 19. USP - U.S. Pharmacopeia; www.usp.org.
 20. USPS - United States Postal Service; www.usps.com.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. DEC – Department of Environmental Conservation
 2. SHPO – State Historic Preservation Office
- F. City Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. EDC – Economic Development Corporation
 2. DPR – Department of Parks & Recreation
 3. DOT – Department of Transportation
 4. DEP – Department of Environmental Protection
 5. SBS – Small Business Services
 6. DOB – Department of Buildings

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 43 39

MOCKUP REQUIREMENTS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Quality Control Submittals
 - 1. Mockup Plan: Copy of proposed plan.

1.03 DEFINITIONS

- A. Mockups (General): Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances.
 - 1. Mockups are not Samples.
 - 2. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- B. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
- C. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

1.04 QUALITY ASSURANCE

- A. Mockup Plan: Detailed, dimensioned plans and elevations showing mockup size, and items and materials that will be included in proposed mockup.
- B. Pre-Construction Conference: Prior to the construction of the mockup, a conference will be called by RIOC's Representative at the Site for the purpose of reviewing the requirements, and intent of mockup. The conference shall be attended by RIOC's Representative, Contractor, and person supervising this phase of the Work

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish as directed.

1. Build mockups in location and of size and profile indicated or, or as directed by RIOC's Representative.
 2. Notify RIOC's Representative a minimum of 7 days in advance of dates and times when mockups will be constructed and able to be inspected.
 3. Employ supervisory personnel to oversee mockup construction. Employ same workers that will be employed during the construction of Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Commence the Work after mockup has been inspected and approved in writing by Director's Representative.
 6. The mockup will establish the standard of quality of workmanship by which the Work will be judged.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. Failure to maintain the mockup, until directed, will be cause for rejection of the Work.
 8. Demolish and remove mockups when directed unless otherwise indicated.
- B. Mockup Types: Construct mockup in accordance with approved shop drawings, project manual, and Contract Drawings, using exact materials and methods approved for the Project, including required accessories.
1. Integrated Exterior Mockups: Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections and supporting materials.

END OF SECTION

SECTION 01 53 00
TEMPORARY CONSTRUCTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. This work shall consist of the design, construction, maintenance and removal of temporary access by the Contractor for structure construction. This work shall include storage and staging areas, temporary access roads (stone fill and geotextile fabric), temporary structures, work trestles, work platforms, necessary for structure construction. The limits of the available work areas shall be as indicated on the plans or as permitted.

1.04 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittals, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Document: The contractor shall submit means and methods and working drawings for temporary works for review and approval for permitting and other relevant requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials to be used in the construction of temporary structures, work trestles and platforms shall be clean and subject to inspection and approval by the Engineer prior to their incorporation in the work. Used materials will be acceptable, provided appropriate allowances are made for their condition.
- B. Geotextile fabric shall meet the requirements of Section 31 32 19 for Geotextile.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. The Contractor is advised that the plans for this project have been prepared based upon access for structure construction from temporary structures, work trestles, work platforms and temporary access roads as unknown conditions.
- B. Temporary structures, work trestles and platforms shall meet the minimum strength requirements to carry all construction equipment and materials at stress levels not to exceed 33% greater than the stress allowed in the current building code or AASHTO "Standard Specifications for Highway Bridges" as amended.
- C. Detailed plans and calculations showing sizes, arrangements, connections, bracing, and quality of materials to be used in temporary structures, work trestles and platforms shall

be submitted to the Engineer for documentation. The plans and calculations shall be designed by a Licensed Professional Engineer licensed in the State of New York and bear the Engineer's seal.

- D. The height of the temporary structures, work trestles and platforms shall be sufficient to allow for construction of adequate bracing and also to have a minimum effect on the environment. Consideration shall be given to ice conditions in the river (if applicable) in the design of the structures, work trestles and platforms.
- E. Temporary structures, work trestles and platforms shall be of sufficient geometric and structural capacity to handle all anticipated loads resulting from the construction of the proposed structure.
- F. All access road work of preparing, improving and restoring roads as required to provide access to the structure construction site shall be performed in accordance with the applicable governing specifications and the plans. Such work may involve clearing, grading, slope stabilization, construction of base courses, hot bituminous pavement, temporary fencing and gates, temporary drainage, dust abatement where required, and maintenance of affected roadway embankments, guard rail, and drainage structures as directed by the Engineer.
- G. Clearing shall involve the removal of vegetation to the limits shown on the plans. Stumps and existing topsoil shall not be removed except as required to construct the structure foundations and as directed by the Engineer. No trees outside the clearing limits shall be removed without approval of the Engineer.
- H. When the temporary access roads, storage and staging areas, structures, work trestles, work platforms are no longer required, they shall be completely removed and the area cleaned up, graded, landscaped and restored to the satisfaction of the Engineer to a condition equal to or better than that originally found or as shown on the plans. elastomeric bearing pads at locations indicated in accordance with indicated details.

END OF SECTION

SECTION 01 56 26

CONSTRUCTION FENCE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the contract documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This Section includes the furnishing, installing, maintaining and removing of an 8 Foot High Construction Fence

1.03 RELATED WORK

- A. Related work is described in the following sections of the specifications:
Section 03 30 00 – Cast-in-Place Concrete

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 CHAIN-LINK FENCE FABRIC

- A. General: Fabric shall be 11 Ga., galvanized steel wire woven into 2 inch diamond mesh, knuckled at the bottom and barbed at the top.

2.02 LINE POSTS

- A. Line posts shall be TYPE I, 2 ½ inch O.D. galvanized steel, standard weight pipe conforming to F 1083, schedule 40, weighing 3.65 pounds per linear foot or posts may be posts may be TYPE II, SS-30 steel tubing as manufactured by Allied Tube and Conduit Corp. Of Harvey, Illinois, or approved equal.
- B. Tubing must conform to ASTM A-569, cold rolled steel pipe and coated with a minimum of 0.9 ounces of zinc per square foot, a minimum of 15 micrograms of zinc chromate per square inch. Steel tubing supplied under this option shall be of the same outside diameter as Schedule 40 pipe and achieve minimum yield strength of 50,000 P.S.I.

2.03 TERMINAL POSTS

- A. Terminal posts, including corner posts and gate posts shall be 3 inch O.D. galvanized steel, standard weight pipe conforming to ASTM F1083 schedule 40, weighing 5.79 pounds per linear foot.

2.04 BRACES

- A. Braces shall be 1 5/8" inch O.D. galvanized steel, standard weight pipe conforming to ASTM F 1083, schedule 40, weighing 2.27 pounds per linear foot. Trusses shall be 5/16" diameter adjustable truss rods.

2.05 TOP & BOTTOM TENSION WIRE

- A. Tension wire shall be No. 6 gauge galvanized wire.

2.06 FITTINGS AND HARDWARE

- A. Hardware, fittings and post caps shall be ductile iron, cast steel or pressed steel, all hot dipped galvanized.

2.07 GATES

- A. Gates shall be of similar construction as the fence and shall be provided with locks. Gates shall be placed at locations as shown on the plans or as required by the Contractor and approved by RIOC's Representative. RIOC's Representative shall be supplied with a set of keys, one (1) key for every lock.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Corner and gate posts shall be set in concrete footings to a minimum of three (3'-0") feet. Braces and truss rods shall be installed adjacent to corner and gate posts. Line posts shall be driven directly in the ground to a minimum depth of three (3'-0") feet. All posts shall be set true to line and grade.
- B. Where rock or wet areas are encountered, the Contractor shall submit details for adequately securing the posts in place.
- C. Chain link fabric shall be secured to line posts with 3/16" inch aluminum tie-wire spaces 18 inches apart on posts. Fabric shall be secured to terminal posts with tension bars and bands and to top and bottom tension wires with 9 gauge hot rings spaces 24 inches apart. Post caps shall be installed on all posts
- D. Line post spaces shall not exceed 8'-0" on center
- E. Contractor is also responsible for restoration of any lawn or pavement disturbed by fence or in areas adjacent to fencing, after removal of fencing is complete. The cost of restoration shall be included under this item. Finished fence shall not displace Fence Company name or other forms of advertising.
- F. The contractor shall maintain the chain link construction fence and gates during the life of this contract and shall repair or replace all members that are disturbed, damaged, destroyed or vandalized at no cost to RIOC. Upon completion of the work the fence shall be removed by the Contractor.

END OF SECTION

SECTION 01 56 39

CARE AND PROTECTION OF TREES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. The Contractor shall provide the care and protection of trees in consultation with RIOC's Representative and Landscape Architect in accordance to the drawings.

1.03 RELATED SECTIONS

Section 01 14 10 – Consultant Arborist
Section 31 13 01 – Selective Tree Removal and Trimming
Section 31 13 12 – Preparatory Fertilize Existing Tree
Section 31 13 15 – Temporary Tree Guard

1.04 SUBMITTALS

- A. Plans: Provide a tree protection plan in accordance with the contract drawings and this specification.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION

3.01 METHOD

- A. A Tree Protection Plan shall be formulated and / or finalized in consultation with the Landscape Architect, Consultant Arborist, and RIOC's Representative.
- B. This plan should include, but not necessarily be limited to, the location of temporary wooden tree guards, construction fence, temporary snow fence boundary, range fencing, micro tunneling, soil erosion and sediment control, hand and/or pneumatic excavation, soil compaction prevention and mitigation requirements, impact of trenching and/or cut and fill operations and a compensatory pruning and fertilization schedule. In addition, the plan should address the Contractor's operations, including designated staging areas, site access and stockpiling of materials.
- C. The Critical Root Zone (CRZ) shall be defined as the area within the dripline of existing trees, unless otherwise shown on the Tree Protection Plan.
- D. Mandatory provisions of the tree protection plan always include, but are not limited to, the following provisions:
 - 1. The Contractor shall not be permitted to park vehicles or equipment or to stockpile materials of any nature under the drip line of trees and shrubs in order to minimize

- surface and subsurface root damage and soil compaction. This directive shall apply to all areas within or outside the contract limit line.
2. All Tree pruning and tree removal is to be performed by an arborist holding certification from the International Society of Arboriculture (ISA) or equivalent education and experience.
 3. All contact between equipment and overhead tree limbs should be avoided. Bending or breakage of limbs is prohibited. If clearance pruning is proposed, it shall not take place without the written permission of the Agency, and then shall only be performed with professional equipment as per the Agency's standards and specifications for such work.
 4. All trees within the limits of the contract limit line are to receive at least one (1") inch (the equivalent of 750 gallons of water per 1000 square feet of tree protection zone) of water per week between the months of March and October as directed by the Consultant Arborist. If rainwater in any given week is below this quantity, the Contractor must supplement the amount received by utilizing soaker hoses or as directed by the Agency. If a water source is unavailable at the site, then the Contractor must provide tree irrigation bags or a water truck to apply the requisite amount of water.
 5. Where excavations are performed within the tree protection zone for removal of existing features or installations of new work, the excavated area shall be backfilled immediately and/or roots shall be kept constantly moist with burlap covered with white plastic and checked a minimum of two (2) times a day, once in the morning and once in the afternoon, for a maximum of forty-eight (48) hours, until backfill is complete as directed by the Consultant Arborist. If directed, soaker hoses shall be installed to facilitate properly moist conditions. No pooling of water or continuous running water shall occur within the tree protection zones other than that during the irrigation process.
 6. The Contractor shall exercise extreme care in removing concrete or asphalt within the tree protection zone, lifting rather than dragging paving pieces. Tools and equipment for this activity shall be approved by the Consultant Arborist prior to the start of excavation.
 7. Any excavation or trenching for utility or infrastructure installation within a tree protection zone or elsewhere on the site as designated by the Consultant Arborist shall be done by hand or pneumatic excavation, or micro tunneling.
 8. If directed, the root zone of a tree shall be covered with mulch to a depth of at least six (6) inches or with plywood in order to protect roots from damage caused by heavy equipment. Such covering shall be maintained during the course of construction and removed after the end of construction. Removal shall be by hand or as specified by the Consultant Arborist.
 9. Roots over 1" in diameter shall not be cut without the written permission of the Consultant Arborist.
 10. Protective fencing shall be paid for separately as per the drawings or as directed by the Consultant Arborist.
 11. Tree guards with tree wraps shall be installed on all trees within the contract limit lines or limits of the construction zone as shown on the Tree Protection Plan.
 12. Fencing material shall follow Parks specifications and standards and shall be construction (chain link) fencing or orange polyethylene (snow) fencings or range fencing, as specified by the Consultant Arborist. The minimum height of fencing shall be four feet (4').
 13. Fences and tree guards shall not be removed or moved without written permission of the Consultant Arborist, or his designated representative.
 14. All tree protection fenced zones shall be so indicated with signage posted visibly on the fenced in area as directed by Landscape Contractor. Wording shall read "Tree Protection Zone".

15. Signs will be provided by the Agency. Contractor is to be held responsible for fixing and maintaining signs for the duration of the Contract.
 16. Planting beds that are installed within tree protection zones can only be done in the presence of the Consultant Arborist. All excavation and plant installation is to be done by hand, with minimal soil disturbance. No roots over 1" in diameter shall be cut without the written authorization of the Consultant Arborist. Plants shall not be placed within 3 feet of the tree trunk unless directed by the Consultant Arborist.
- E. REMEDIATION – In the event of damages to trees and shrubs resulting from the Contractor's work, as determined by the Consultant Arborist, the following shall apply:
1. At the completion of the construction project and in response to field conditions, any of the following site restoration/mitigation measures may be required by the Agency in addition to those specified in the tree protection plan. These measures shall be assumed at the expense of the Contractor and shall not be done without the approval of the Consultant Arborist.
 - a. Soil analysis. Soil testing may be required to determine fertilization and soil amendment applications.
 - b. Compensatory soil decompaction/ enrichment (scarification, vertical mulching and/or fertilization, radial trenching) See specification.
 - c. Soil aeration, i.e. the injection of air or pressurized water into the soil. (TerraVent or other similar method, see specification).
 - d. Pruning of dead or diseased tree branches, and/or dead tree removal.
 - e. Root collar excavation, to remove any soil that accumulated around the base of the tree during construction.
 - f. Tree irrigation, for up to one year after the end of construction. Method is to be as directed by the Consultant Arborist, or as per the applicable specification.
 - g. Mature tree regeneration, i.e. Paclobutrazol injection.
 - h. Soil replacement in eroded areas.
 - i. Root pruning.
 - j. Bark tracing
- F. RESTITUTION:
1. Tree damage. For trees that are damaged during the course of construction, a monetary credit shall be taken. The monetary assessment shall be the difference between the tree's condition rating, as per the International Society of Arboriculture appraisal method, before and after the damage. The damage assessment shall be determined by qualified Agency personnel.
 2. Tree Destruction. Any trees irreparably damaged during the course of construction, as determined by the Consultant Arborist shall be removed at the Contractor's sole expense. Restitution shall be made according to the Basal Area Replacement formula, as determined by the Agency. Restitution can be met by the Contractor through the following options:
 - a. Direct planting by the Contractor of the required equivalent number of replacement trees at locations determined by the Consultant Arborist.
 - b. A monetary credit for the value of the tree destroyed; or
 - c. A combination of (a) or (b) above, as determined by the Consultant Arborist.

3.02 ASIAN LONGHORNED BEETLE QUARANTINE ZONE:

- A. Any Sub/Contractor who will perform tree work of any kind within the Asian Longhorned Beetle (ALB) Quarantine Zone must be Certified by the State of New York Department of Agriculture and Markets. Tree work includes, but is not limited to planting trees, transplanting trees, pruning & fertilizing trees, removing trees and stumps, and clearing and

grubbing trees or roots. To view a current map of the geographic area included in the quarantine zone within New York City, see the following website: <http://www.na.fs.fed.us/spfo/alb/maps/ny/newyorkcity.htm>. The Asian Longhorned Beetle (ALB) is a destructive wood boring insect. It can cause serious damage to healthy trees by boring into their heartwood and eventually killing them. Nursery stock, logs, green lumber, firewood, stumps, roots, branches and debris of one-half (½") inch or more in diameter are subject to infestation. In an effort to control the spread of the beetle to other areas, a quarantine has been imposed on large portions of the City of New York as per Part 139 of Title 1 NYCRR by the State of New York Department of Agriculture and Markets. All Sub/Contractors will be held responsible for compliance with State of New York Agriculture and Market Law and Emergency Rule Making. For additional information regarding procedures, see the U.S. Department of Agriculture (USDA) website: <http://www.aphis.usda.gov/oa/alb/alb.html>.

3.03 UTILITY PRUNING REQUIREMENTS:

- A. Wires shall be treated as live and high voltage until verified by the utility. Branches touching wires shall be pruned by the utility before work begins. Limbs and branches shall not be dropped onto overhead wires. If limbs or branches fall across electrical wires, all work shall stop immediately and the utility shall be called.
- B. When climbing or working in trees, pruners shall try to position themselves so that the trunk or limbs are between their bodies and electrical wires. Pruners shall not work with their backs toward electrical wires. A bucket truck is the preferred method of pruning when climbing poses a greater electrical contact threat.
- C. Personal protective gear shall have appropriate all-electric characteristics needed for working near electricity.

END OF SECTION

SECTION 01 58 13
TEMPORARY PROJECT SIGN

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Under these items, before commencing any work on the site, the Contractor shall furnish install one (1) Project Sign and one (1) Project Rendering, and in accordance with the specifications, and directions of Director's Representative and satisfaction of RIOC.

1.03 SUBMITTALS

- A. Shop Drawing: Provide Full size shop drawing of each sign for review and approval by RIOC prior to fabrication.
- B. Sample: Provide half-size sample print of each sign for review and approval by the RIOC prior to fabrication.

1.04 SIGN QUALITY

- A. The Contractor shall provide all materials required for the production of the sign as specified herein. Workmanship shall be of the best quality, free from defects and shall be produced in a timely manner. The quality shall be such that the sign maintains the color for the life of the project.

1.05 SCHEDULE

- A. Upon project mobilization, the Contractor shall commence production and installation of the sign.
- B. The submittals shall be submitted for review and approval and fabricated within one month of the project commencement.

PART 2 - PRODUCT

2.01 MATERIALS

- A. SIGN CONSTRUCTION: Shall be a one piece 4' x 8' x 1/2" (minimum thickness) corrugated plastic with 3/4" diameter metal grommets in four corners, at the midpoint along the sides and at approximately 12" spacing along the top and bottom edges.
- B. IMAGES: The full color images are to be adhered to the corrugated plastic.

2.02 SIGN GRAPHICS

- A. All visual components of the sign are in an Adobe *.pdf file, which is provided by RIOC. The file is to be opened in Acrobat Professional or Acrobat Approval in order

to be saved with project information. RIOC's Representative shall insert the project name and names and titles of personnel (3 or more), any images, and any other required information associated with the project. At no point in the update, saving or renaming of the file should it be locked by any user. The digital file shall be provided by RIOC to the Contractor (on a CD or via E-mail). Contractor shall be instructed to provide the CD to fabricator.

- B. The RIOC *.pdf file with names provided by RIOC's Representative shall be reproduced digitally at the Sign Panel size of 4' x 8', on outdoor non-fading vinyl with matte uv laminate with 6-year lifespan made by 3M, Avery, Orical, or an approved equivalent. Vinyl shall be guaranteed for six years. Guarantee must cover fading, peeling, chipping or cracking/

PART 3 - EXECUTION

3.01 DELIVERY AND INSTALLATION

- A. Each sign is to be delivered to the project site office. The location of the signs within the project limits will be as directed by RIOC's Representative.
- B. Project signs shall be installed by means and methods recommended by the Contractor and approved by RIOC's Representative.

3.02 MAINTENANCE AND REMOVAL

- A. The Contractor shall protect the sign from damage during the continuance of work under the Contract and shall do all patching of lettering, painting and bracing thereof necessary to maintain same in first class condition and in proper position.
- B. Replacement of the signs due to improper installation and neglect beyond normal care will be at no additional cost to the City.
- C. Sign shall remain on display where posted until the completion of the work except that, when so ordered by RIOC's Representative, the Contractor shall remove, relocate or repost sign as directed.
- D. The project signs shall be removed and disposed of by the Contractor at the end of the project when directed by RIOC's Representative.

END OF SECTION

SECTION 01 74 00

WARRANTIES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1-General Requirements, apply to the work of this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

B. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

1.03 Related Sections: The following Sections contain requirements that relate to this Section:

Section 01 77 16 – Contract Closeout

Divisions 2 through 34 Sections for specific requirements for warranties on products and installations specified to be warranted.

Certifications and other commitments and agreements for continuing services to RIOC are specified elsewhere in the Contract Documents.

Review limitations below with RIOC's legal counsel to determine if exceptions or modifications are necessary.

Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

Separate Prime Contracts: Each prime contractor is responsible for warranties related to its own contract.

1.04 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to RIOC.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for RIOC.

1.05 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether RIOC has benefited from use of the Work through a portion of its anticipated useful service life.
- D. RIOC's Recourse: Expressed warranties made to RIOC are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which RIOC can enforce such other duties, obligations, rights, or remedies.
- E. Rejection of Warranties: RIOC reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- F. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, RIOC reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.06 SUBMITTALS

- A. Submit written warranties to RIOC's Representative prior to the date certified for Substantial Completion. If the Director's Representative's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Director's Representative or the Field Engineer.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to RIOC, through the Director's Representative, for approval prior to final execution.

C. Refer to Divisions 2 through 34 Sections for specific content requirements and particular requirements for submitting special warranties.

D. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

E. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

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CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Waste Management Goals
 - 2. Diversion and disposal of demolition and construction waste.
 - 3. Construction and Demolition Waste Management Plan (C+DWM Plan)
 - 4. C+DWM Plan implementation
- B. Sustainable Building Requirements
 - 1. RIOC requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include construction waste recycling. The Contractor shall ensure that the requirements related to these goals, as defined in the Articles below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the Project's environmental goals.

1.3 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. ADC: Alternative Daily Cover
 - 2. C+D: Construction and Demolition
 - 3. C+DWM Plan: Construction and Demolition Waste Management Plan
- B. Definitions:
 - 1. Alternative Daily Cover (ADC): Cover material other than soil placed on the surface of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.
 - 2. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
 - 3. Commingled Waste: Waste streams that are combined on the project site and hauled away for sorting into recyclable streams. Commingled Waste is considered as one Waste Stream unless diversion rates can be provided by the recycling facility for specific materials based on measured quantities. Also known as single-stream recycling.
 - 4. Construction and Demolition Waste: Building and site improvement materials and other solid waste resulting from construction, demolition, remodeling, renovation, or repair operations. Construction waste includes packaging. Hazardous materials, land clearing debris, excavation soil, and landscaping materials are not included.

5. Construction and Demolition Waste Management Plan (C+DWM Plan): A project-specific plan for the collection, separation, handling, transportation, and disposal of waste generated at the construction site, to reduce the amount of waste sent to landfill or incineration.
6. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations. Hazardous materials, land clearing debris, excavation soil, and landscaping materials are not included.
7. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
8. Diversion: To remove, or have removed, from the site for recycling, reuse, salvage, donation, or wood combustion, materials that might otherwise be sent to a landfill or incinerator. Diversion from landfill does not include burning, incinerating, thermally destroying waste, or waste-to-energy processes, except for wood-derived fuel or wood combustion, which is considered diversion.
9. Diversion Rate: The percentage of material by weight or volume that is diverted from landfill or incineration by Recycling, Salvage, Reuse, donation, or combustion (for wood only). The total weight or volume of Recycled, Salvaged, Reused, and donated material, plus combusted wood, is the numerator; the total weight or volume of Construction and Demolition Waste is the denominator. Land clearing debris, excavation soil and landscaping materials, and hazardous waste SHALL NOT be included in total weight or volume of Construction and Demolition Waste for this calculation. ADC and non-wood waste used as incinerator fuel do not count as diversion but must be included in total construction and demolition waste. Diversion Rate is also referred to as 'Recycling Rate'.
10. Diversion Stream: A flow of materials coming from a job site into markets for building materials, comprised of both a Material Category (or mixture of several material categories) and a Diversion Method.
 - a. Examples of Diversion Streams include source separated materials sent to specific recycling facilities, commingled waste sent to a mixed-waste recycling facility, deconstructed materials sent back to a manufacturer as part of a take-back program, or salvaged materials reused on site.
 - b. Examples of Material Categories include the following. Each of these is considered a separate Diversion Stream when separated on site, however multiple materials that are commingled on site are considered one diversion stream.
 - 1) Metal
 - 2) Plastic
 - 3) Wood
 - 4) Masonry
 - 5) Cardboard/paper
 - c. Examples of Diversion Methods include:
 - 1) On-site Separation: Gypsum scrap; metal framing scrap; ceiling tile scrap; carpet scrap
 - 2) On-site waste diversion: Crushing concrete or asphalt for reuse onsite
 - 3) Reuse Off-site: Pallets; wood reels; blankets
 - 4) Salvage
 - 5) Donations: Tax deductible; non-tax deductible
11. Land Clearing Debris and Soil: Natural materials such as rock, soil, stone and vegetation. Excludes man-made materials even if found on-site pre-construction.
12. Non-Diversion Streams: Materials disposed of via landfills (including Alternative Daily Cover) or incinerators (excluding wood combustion).

13. Onsite Separation: Placing of selected materials in special containers or areas on the Project site to implement disposal in a segregated waste stream, for specialized recycling.
14. Packaging: Materials used for the protection or handling products delivered to the site, but which are not installed as part of the Work. Examples: Wood reels, pallets, blankets.
15. Recyclable: The ability of a product or materials to be recovered at the end of its life cycle and remanufactured into a new product.
16. Recycle (Recycling): Recovery of demolition and construction waste for subsequent processing in preparation for reuse.
17. Return: To send back reusable or unused products to vendors or manufacturers.
18. Reuse: Recovery of demolition or construction waste and subsequent incorporation on site into the Work of this Project.
19. Salvage: Recovery of demolition or construction waste from existing buildings or construction sites and subsequent sale or reuse in another facility.
20. Segregation: To place similar waste materials together for collection in a designated site area, trash bin, or roll-off container.
21. Source Reduction: Strategies minimizing potential waste that is brought to or generated on the site. Examples: Reduced packaging; industry standard dimensioned materials; prefabrication.
22. Waste Stream: Comprised of two major substreams: waste disposed of via landfills or incinerators and waste diverted from disposal through recycling, reuse, salvage, or donation (i.e., Diversion Stream). Land clearing debris, soil and landscaping materials, and hazardous waste do not qualify as a Waste Stream.
23. Waste-To-Energy: The conversion of non-recyclable waste materials into usable heat and/or fuel through a variety of processes such as combustion (not including the combustion of wood into wood-derived fuel), gasification, pyrolyzation, anaerobic digestion, and land fill gas.

1.4 PERFORMANCE REQUIREMENTS

- A. Project Diversion Goal: RIOC has established a goal to achieve total diversion rate of a minimum of seventy five percent (75%) by weight or volume for the total non-hazardous solid waste generated by the Work,.
- B. Alternative Daily Cover (ADC) must be accounted for in the waste diversion calculations, but does not qualify as material diverted from disposal.
- C. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.
- D. Diversion Requirements: Salvage, recycle, or reuse as much non-hazardous construction waste as possible. Diversion shall include, but not be limited to, the following waste categories as applicable to the Project:
 1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.

- d. Concrete masonry units.
 - e. Clean dimensional wood, trim, paneling, plywood, and oriented strand board.
 - f. Structural and miscellaneous steel.
 - g. Piping.
 - h. Supports and hangers.
 - i. Electrical conduit.
 - j. Copper wiring.
 - k. Lighting fixtures.
 - l. Lamps.
 - m. Ballasts.
 - n. Electrical devices.
 - o. Switchgear and panelboards.
 - p. Transformers.
2. Construction Waste:
- a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Metals.
 - e. Piping.
 - f. Electrical conduit.
 - g. Packaging: Regardless of diversion goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.
 - h. Waste generated by on-site workers, such as plastic and metal beverage containers.
- E. Hazardous Waste: Take appropriate measures for safe collection, storage and disposal of hazardous waste (e.g. batteries, mercury-containing lamps, e-waste), in accordance with all applicable law, codes, and standards.

1.5 SUBMITTALS

- A. General: Submit the following according to Conditions of the Construction Contract and Division 01 Specification Sections. Quantities may be indicated using either weight (lbs. or tons) or volume (cubic yards), however the method shall be consistent throughout the duration of the Project.
- B. Construction and Demolition Waste Management Plan (C+DWM Plan): Within 30 days of date established for the Notice to Proceed, submit for approval a detailed C+DWM Plan in accordance with the following requirements:
 - 1. Project Diversion Goal, as outlined in this Section.
 - 2. Identify responsible parties for C+DWM Plan implementation.
 - 3. Waste Identification: List all Diversion Streams applicable to the Project.
 - 4. For each Diversion Stream, identify Diversion Method, including but not limited to:
 - a. On-site Separated

- b. Commingled
 - c. Re-Use: Wood pallets; Wooden reels; Blankets
 - d. Salvage (when applicable)
 - e. Sale or Donation (when applicable)
5. Describe Project-specific means and methods by which waste generated by the Project will be diverted or disposed:
- a. Materials Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including whether waste will be segregated on-site or commingled and separated off-site, means by which recyclable materials will be protected from contamination, sizes of containers, container labeling procedures, and designated location where materials separation will be performed.
 - b. Describe source reduction strategies to reduce the quantity of C+D waste generated by the Project (e.g., take back of reusable material packaging, such as wood reels, pallets, or blankets).
 - c. Waste Hauling Procedures:
 - 1) Identify names, addresses, and telephone numbers of all Waste Haulers which will be hauling waste materials for the Project.
 - 2) Provide sample waste hauler contract, including waste reporting structure; sample waste report; responsible parties; contact information; and chain of communication.
 - d. Sorting and Recycling Facility Procedures:
 - 1) Identify names, addresses, and telephone numbers of all sorting, recycling, and disposal facilities which will be accepting waste materials for the Project.
 - 2) Describe how all sorting, recycling, and disposal facilities will process waste materials for the Project. Visual inspection is not an acceptable method of evaluation for determining diversion rate of commingled waste streams.
 - e. Salvage, Sale and Donation Procedures:
 - 1) Identify names, addresses, and telephone numbers of all individual and organizations which will be accepting waste materials for the Project.
 - 2) For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - f. Landfill and Incineration Facility Procedures:
 - 1) Indicate how and where materials will be disposed of.
 - 2) Include name, address, and telephone number of each landfill and incinerator facility. Distinguish between wood and non-wood waste sent to incinerator.
 - g. Other Disposal Procedures: Account for and describe disposal method for all other waste materials, including those that will not contribute to diversion from landfill. Non-recyclable waste should be distinguished from non-diverted waste that cannot be included in Diversion Rate calculation, including:
 - 1) Land clearing debris
 - 2) Excavation soil and rock
 - 3) Hazardous Materials (provide summary of materials and identify safe removal and disposal strategies for each material)
6. Kick-off meeting and additional meetings as required informing Subcontracted Trades of requirements, and monitoring their progress towards the Project goals.
7. Waste Reduction Tracking and Documentation: Describe Project-specific means and methods by which diverted or disposed waste generated by the Project will be tracked for reporting.
- a. Retain waste hauler reports.

- b. Retain tickets or receipts for all waste disposal at landfill facilities.
 - c. Record estimated weight or volume of materials that are reused or salvaged.
 - d. Retain receipts and record estimated weight or volume of materials that are donated or sold.
 - 8. C+D Waste Estimates:
 - a. Estimate weights or volumes for the following:
 - 1) Each Diversion Stream applicable to the Project;
 - 2) Materials that will not be diverted;
 - 3) Total waste (diverted + not diverted).
 - b. Estimate diversion rate for the following:
 - 1) Waste diverted / total waste as a percentage;
 - c. Provide assumptions for estimates.
- C. Waste Hauler(s) C+D Progress Report: The Waste Hauler(s) shall submit progress reports to the Contractor on a monthly basis or as directed by RIOC. The Waste Hauler(s) C+D Progress Report shall include the following information for the time period covered:
 - 1. The names of all Waste Streams per the C+DWM Plan. This includes Diversion Streams and Non-Diversion streams.
 - 2. The name and address of the sorting, recycling, or disposal facility for each Waste Stream.
 - 3. Weight or volume for each Waste Stream.
 - 4. Total weight or volume of waste.
- D. Contractor C+D Progress Report: The Contractor shall submit progress reports to RIOC on a monthly basis or as directed by RIOC prior to application for payment. Contractor shall track demolition and construction waste diversion throughout the project and maintain documentation of materials and disposal methods. Progress Reports shall include the following information for the time period covered:
 - 1. Compiled information from all Waste Haulers for all Waste Streams into a single report.
 - 2. Updated Construction & Demolition Waste Tracking Log for all waste hauled from site, identifying:
 - a. Date of pick-up by Waste Hauler
 - b. Waste Hauler Name
 - c. Waste receptacle description (type, size)
 - d. Gross Total quantity, measured by weight or volume, of demolition and construction waste hauled from the Project site during the period.
 - e. Quantity of materials disposed of in landfills or incineration facilities as a percentage of total waste during the period.
 - f. Quantity of materials, measured by weight or volume, diverted by methods of recycling, reuse, salvage, and/or donations during the period. Include breakdown of diverted waste for major material types, including but not limited to:
 - 1) Asphalt
 - 2) Cardboard and Papers
 - 3) Wood
 - 4) Commingled Waste
 - 5) Metals
 - 6) Masonry
 - 7) Concrete
 - 8) Plastic
 - g. Quantity of land clearing debris, excavation soil, and hazardous material (if applicable). Note that these materials shall be reported but excluded from Waste Diversion Calculations.

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1.6 CLOSEOUT SUBMITTALS

- A. Provide final approved C+DWM Plan and summary table indicating site-separated waste, by diverted material type, that indicates the total percentage of construction waste diverted from landfill and the identified Diversion Streams prior to request for Substantial Completion.
- B. Contractor Final Summary Report. At the completion of waste management activities for the Project and prior to final application for payment, the Contractor shall provide a report summarizing the final diversion and disposal quantities.
 - 1. The Final Summary Report shall include the following:
 - a. Material description and material type for each material stream.
 - b. Cumulative waste for each material stream, measured by weight or volume, for Project to date.
 - c. Average percentage of ADC produced by the sorting facility receiving commingled waste stream.
 - d. Cumulative diverted waste for each material stream, measured by weight or volume.
 - e. Percent of each material stream diverted.
 - f. Cumulative quantity of each material stream sent to landfill, measured by weight or volume.
 - g. Cumulative diverted waste as a percentage of total waste.
 - h. Gross Total quantity of demolition and construction waste generated on site.
 - i. Gross Total quantity of demolition and construction waste diverted from landfill.
 - j. Total number of material streams tracked for the Project.
 - k. Calculations may be performed using either weight (lbs. or tons) or volume (cubic yards), however the method shall be consistent throughout the duration of the Project.
 - l. Name and location of the recycling or disposal facility that accepted each material.
- C. Waste Hauler(s) Final C+D Report:
 - 1. Submit to Contractor prior to request for Substantial Completion.
 - 2. Include following information covering the entire time period for Waste Hauler's scope of work:
 - a. The names of the Waste Streams per the C+DWM Plan.
 - b. The name of the sorting or disposal facility for each Waste Stream.
 - c. Sorting Facility Report for each disposal facility.
 - d. Weight or volume for each Waste Stream.
 - e. Total quantity of waste, measured by weight or volume.
 - f. Final Diversion (Recycling) Rate
 - 3. Provide backup documentation concurrent with the Waste Hauler's Final C+D Report:
 - a. Recycling and Processing Facility Records: Document receipt and acceptance of recyclable waste by licensed recycling and processing facilities. Include legible copies of on-site logs, manifests, weight tickets, receipts, and invoices.
 - b. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include legible copies of manifests, weight tickets, receipts, and invoices.
 - c. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and charitable organizations. Indicate whether organization is tax exempt.
 - d. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section for "Project Management and Coordination". Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.
- E. Project Meetings: Waste management plans and implementation shall be discussed at the following meetings:
 - 1. Pre-demolition meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.
 - 4. Sub-contractor job-site coordination meetings.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Division 01 Section for Temporary Facilities and Controls.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute C+DWM Plan to all impacted parties within three (3) days of submittal return.
 - 2. Distribute C+DWM Plan to entities when they first begin work on-site. Review plan procedures and locations established for diversion and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold. Provide labeling in multiple languages as needed to enable proper communication and understanding.
 - 2. Comply with Division 01 Section for Temporary Facilities and Controls for requirements to control dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted to be stored on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area off-site.
 - 5. Protect items from damage during transport and storage.
- D. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- E. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Grind asphalt to maximum 1-1/2-inch (38-mm) size and use for general fill.
- B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch size.
 - 2. Crush concrete and screen to comply with requirements in Division 31 Section related to Earth Moving for use as satisfactory soil for fill or subbase.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 3/4-inch size.
 - 2. Clean and stack undamaged, whole masonry units on wood pallets.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- F. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- I. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials on the Project site.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

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CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 CONTRACT CLOSEOUT INSPECTIONS

- A. The following 3 inspections will be made in addition to the normal inspections to ensure that all Contract requirements are met and that the Work is complete and acceptable. The purpose of each of these inspections is to furnish the Contractor a written list of Contract exceptions, omissions, and incompletions so that the Work can be progressed to timely completion in accordance with the Contract Documents.
 - 1. Detailed Inspection: The "Detailed Inspection" will be made when the Work is substantially complete. A copy of the detailed inspection list will be furnished to the Contractor. When this inspection progresses over any length of time, copies of the list will be furnished as the inspection progresses so that the Contractor may proceed with the required Work without delay.
 - 2. Final Inspection: The Contractor will be advised by letter of the date and time of final inspection. A copy of the final inspection list containing all incomplete or unsatisfactory items and the time allowed to complete the Work will be furnished to the Contractor.
 - 3. Joint Inspection for Physical Completion: The joint inspection for physical completion may be made to verify completion of the exception items listed on the final inspection list so that the physical completion date (defined in the General Conditions) may be established.

1.02 FINAL CLEANING

- A. Perform final cleaning prior to joint inspection for physical completion. Leave the premises in a neat, unobstructed condition, the work areas broom clean (except where more thorough cleaning is specified), and everything in perfect repair and adjustment.
- B. Clean site; sweep paved areas, rake clean landscaped surfaces.
- C. Remove tools, equipment, waste and surplus materials, rubbish, and construction facilities from the premises as soon as possible upon completion of the Work.

1.03 PROJECT RECORD DOCUMENTS

- A. Maintain on site, 2 sets of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Project Manual.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store record documents separate from documents used for construction.

- C. Record information concurrent with construction progress.
- D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish (first) (main) floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract Drawings.
- E. Upon completion of the work, create electronic versions of the project record documents. Black and white documents are to be scanned into TIFF format using CCIT Group 4 compression. Documents with color, which include black line documents with color notations, are to be scanned into TIFF format using a minimum of 8 colors and "packbit" compression.
 - 1. The scanned images are to be put on a compact disc (CD) using ISO 9660 format. Name the electronic files with the same name as the drawing. Create a folder on the CD for each trade and one for Shop Drawings.
 - 2. Label the CD with the project number, name, and title as it appears on the project manual cover. If there is more than one CD include notation to that effect on the label; i.e., 1 of 3, 2 of 3, 3 of 3. The project record documents, and CD(s) are to be turned over to the RIOC's Representative.
- F. Applications for progress payments will not be approved if the record documents are not kept current. Application for final payment will not be approved until the project record documents are delivered to RIOC's Representative.

1.04 OPERATION AND MAINTENANCE DATA

- A. Prepare 2 sets comprised of 8-1/2 x 11 inch text pages bound in capacity expansion binders with durable plastic covers identified with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required. Prepare a printed Table of Contents for each volume, with each product or system description identified. Internally subdivide the binder contents with permanent page dividers, logically organized as described below, with tab titles clearly printed under reinforced laminated plastic tabs:

Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.

Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:

- 1. Significant design criteria.
- 2. List of equipment.
- 3. Parts list for each component.

4. Operating instructions.
5. Maintenance instructions for equipment and systems.
6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

Part 3: Project documents and certificates, including the following:

1. Shop drawings and product data.
2. Air and water balance reports.
3. Certificates.
4. Photocopies of warranties.

- B. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with the RIOC's comments. Revise content of documents as required prior to final submittal.
- C. Submit 2 volumes prior to final Application for Payment.

1.05 WARRANTIES

- A. Furnish warranty certification and copies of warranties that extend beyond the one year period required by the General Conditions. Warranties submitted without warranty certification will not be accepted.
 1. Warranty Certification: Written certification from the warrantor that invoices for installation, service, supplies, and warranty fees have been paid in full to persons or firms due payment, and that the warranty is in effect and non-retractable due to any of the specified conditions.
- B. Prepare printed Table of Contents and assemble warranty certifications and warranty copies in a binder with a durable plastic cover.
- C. Deliver the binder to RIOC's Representative prior to final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, indicating date of acceptance as start of warranty period.
- E. Applications for final payment will not be approved until the warranty certification and warranty documents are delivered to RIOC's Representative.

1.06 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Label and deliver spare parts, maintenance items, and extra materials to the Site. Place in locations as directed.
 1. Include "NOT FOR WARRANTY REPAIRS" on the labels.
 2. Obtain receipt prior to final payment.
- B. Do not use the spare parts and maintenance materials required by the Contract Documents to remedy defects during the one-year period described in Paragraph 9.8 of the General Conditions except when approved otherwise by authorized Facility Representative. In such cases, replace items used.
- C. Furnish the names, business addresses, and telephone numbers of fully equipped authorized service organizations to the RIOC's Representative.

- D. Applications for final payment will not be approved until these items are delivered to RIOC's Representative.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- B. Section includes requirements to instruct RIOC's personnel in operation and maintenance of systems, subsystems, and equipment.

Project components that require training are:

1. Water supply system
2. Electrical supply system
3. Lighting elements
4. Irrigation system

1.03 SUBMITTALS

- A. Training: Submit outline of instructional program for demonstration and training, including a and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module.
- B. Product Data: relevant manufacturer and product data for any RIOC requested components
- C. Product Manual: relevant product manual for any RIOC requested components
- D. Other: For each training module, submit list of participants and length of instruction time.

1.04 COORDINATION

- E. Coordinate instruction schedule with RIOC's operations. Adjust schedule as required to minimize disrupting RIOC's operations and to ensure availability of RIOC's personnel.
- F. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 02 02 22

DEMOLITION AND REMOVALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This section describes the demolition and removal of all existing site features, surface, and sub-surface materials within the project limits as required for construction of the project.
- B. The Contractor shall obtain the necessary permits one (1) week prior to demolition.

1.03 RELATED SECTIONS

Section 00 73 93 - Care and Protection of Trees
Section 01 56 26 - Construction Fence
Section 02 02 23 - Tree and Stump Removal
Section 31 12 00 - Clearing and Grubbing
Section 31 22 00 - Grading, Filling and Compaction
Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 25 00 - Erosion and Sediment Control

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

- A. The Contractor shall be responsible for the demolition and removal of all existing surface and sub-surface materials within the project limits as required for construction of the project. Removal of the paved surfaces shall include but not be limited to roads, curbs, sidewalks, walkways, pedestrian paths etc. The Contractor shall be responsible for full depth removal of all pavement and subsurface materials.
- B. Removal of miscellaneous structures and amenities shall include, but not be limited to: signs, light poles, trees, steps, shrubbery, debris, fencing, posts, guardrail, conduits and incidentals.
- C. All non-salvaged material is deemed unclassified excavation and shall be demolished and disposed of off-site, legally and promptly by the Contractor.

END OF SECTION

SECTION 02 02 23

TREE AND STUMP REMOVAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 RELATED SECTIONS

Section 00 73 93 – Care and Protection of Trees
Section 01 40 10 – Consultant Arborist

1.03 DESCRIPTION

Under this item, the Contractor shall cut and remove within the contract limits, all trees and stumps over six (6) inches DBH, including the root to a depth of three (3) feet below the surface, where shown on the plans or as directed by the Landscape Architect.

SPECIAL REQUIREMENTS FOR LONGHORNED BEETLE QUARANTINE ZONE: For tree work to be performed within the quarantine zone, the Contractor shall utilize the service of a Sub/Contractor certified by the New York State Department of Agriculture and Markets. Due to current Federal, State and NYC DPR policy, any wood waste that is generated must be completely chipped within the Quarantine Zone, by said certified Sub/Contractor. Log splitting equipment, where necessary, shall be utilized at no extra cost to RIOC.

Note: DBH is defined as Diameter at Breast Height, which is 4'-6" above grade.

NOTE: Trees six (6") in DBH and under shall be removed in accordance with "Clearing and Grubbing".

1.04 SUBMITTALS

1. Qualification Data: Qualifications in Quarantine Zone, State Certification - For all contracts within the Quarantine Zone, the Sub/Contractor must submit a copy of a valid Compliance Agreement issued by the State of New York Department of Agriculture and Markets, Division of Plant Industry.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

The Contractor shall carefully protect against damage all existing trees, plants and other features to remain. He shall be liable for any damage to such trees, plants, park features and other property caused by Tree Removal operations and all damaged property shall be replaced or restored to its original condition to the satisfaction of the Landscape Architect.

The Contractor shall cut and remove all trees designated for removal within the limits of the contract or as directed by the Landscape Architect. The stumps and roots of these trees shall be removed to a depth of three (3) feet below the ground surface except in areas of fill greater than three (3) feet, where such trees may be cut flush with the ground surface. All voids and excavations left after removal of the tree and roots

shall be backfilled to grade with clean earth fill. The fill shall be placed and compacted by acceptable methods to the satisfaction of the Landscape Architect. Chips generated by root removal operations shall be removed prior to backfilling.

Cutting of trees shall be done by competent workmen only and in workmanlike manner. All trees shall be "topped" and "limbed" previous to felling unless otherwise directed by the Landscape Architect. All branches, limbs, trunks, stumps, roots and other debris shall be removed from the site or otherwise disposed of to the satisfaction of the Landscape Architect.

No trees are to be removed except as ordered by the Landscape Architect.

END OF SECTION

SECTION 02 33 13

UNDERGROUND UTILITY LOCATOR SERVICE

PART 1 GENERAL

1.01 REFERENCES

- A. American Society of Civil Engineers, CI/ASCE 38-02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."
- B. American Public Works Association, Uniform Color Code."

1.02 DEFINITIONS

- A. Utility Quality Levels:
 - 1. Level A: Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.
 - 2. Level B: Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.

1.03 DESCRIPTION

- A. Retain an independent utility locator service company to field locate and mark existing underground utilities and service connections. The word "independent" as used above means a person not in the regular employment of the Contractor or having any vested interest in the Contractor's business.
 - 1. Level B locator service shall be performed in all project areas where excavations, regrading of the ground surface, and penetrations of the ground surface are to be performed.
 - a. Contractor shall include a minimum of 16 hours of Level A locator service to locate underground utilities as identified on the contract drawings or as identified during the Level B investigation that require more specific location, invert elevation, size, etc. Level A investigation shall only be performed at locations where shown or as directed.
 - b. In heavy metal areas, such as near perimeter fences, ground penetrating radar shall be used to determine the location of underground utilities. The use of equipment that induce a tracing signal along the utility path (such as a Metrotech unit) can cause false readings, shall not be used within five feet of fences.
 - 2. The Level A investigation shall be performed as follows:
 - a. Hand excavation may be performed for depths of three feet or less.

- b. Vacuum excavation shall be performed at depths greater than three feet.
 - c. All excavation test pits shall be backfilled by close of business that day.
- 3. Support and protect all utilities and service connections to remain in place.
- 4. The locator service shall field locate and mark underground utilities and service connections prior to excavation.
- 5. The contractor shall be responsible for coordinating the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
- 6. All costs associated with the repair of underground utilities and service connections hit/damaged during the investigative work shall be the responsibility of the contractor.
- 7. Utility location services shall be in accordance with the provisions of CIASCE 38-02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."

1.04 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Submit detailed experience and qualification information about the underground utility locator service company and the persons that will be performing the Work. Detailed experience and qualification information shall include:
 - a. Minimum of five (5) years experience in field locating, marking and staking out of existing underground utilities and service connections.
 - 1) Qualifying Experience: Project information of 5 similar projects, which the locator service company, had worked on during the past 5 years. Information shall include for each project:
 - a) Name and Address of project.
 - b) Dates worked on project.
 - c) Name and telephone Number of contact person at the project site for which the locator service was performed.
 - b. Description of types of utility locator equipment (investigation equipment) that company will utilize to perform the underground utility investigation.
 - c. Names of persons that the persons that will be performing the Work, including the number of years of experience and training that the persons have in the use of the equipment. Include copy of training certificates for locator equipment proving the person performing the locator service are trained on the equipment being used.
 - 2. Submit Quality Control Submittals within 10 days of contract award.
- B. Investigative Report:
 - 1. Submit detailed written report and scaled drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified.
 - a. All documentation shall be referenced to existing data (horizontal and vertical) previously established.
 - b. Provide three (3) paper copies and one (1) electronic copy of detailed written report and drawings.

2. Submit Investigative Report at least two weeks prior to advancing construction within the scheduled areas of excavation within the project site.

1.05 COORDINATION AND SCHEDULING

- A. Coordinate the Work to determine the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
- B. Coordinate the Work with RIOC's Representative to minimize utility disruptions and facility operations. Provide a schedule for the Work required to RIOC's Representative for approval. Upon approval of the schedule, notify RIOC's Representative a minimum of three (3) working days prior to performing the Work.
- C. Within the areas of excavation, all underground utilities and service connections shall be field located and their locations marked at least two (2) weeks prior to the performance of the required excavation work.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 WORK AREAS AND PERFORMANCE

- A. All underground investigation work shall be performed prior to the start of work and contractor shall provide a color-coded site plan showing all existing underground utilities.
- B. If any underground utilities and service connections are hit or damaged during the Work, immediately inform RIOC's Representative for directions on how to proceed.
- C. The utility locator service investigative work, field location and marking of underground utilities and service connections and submission of the investigative report must be completed before any excavation work can begin.
 1. Contractor shall maintain markings throughout the contract duration or until a time when directed (in writing) by RIOC's Representative that maintaining of the markings are no longer required.
- D. Provide subsurface investigation information, detailed written report and drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified, prior to the performance of the required excavation work.
- E. If during the Level B investigations, unknown underground utilities are discovered, RIOC's Representative shall be notified as soon as possible or before the close of that business day.
- F. Field Marking of underground utilities shall follow the American Public Works Association (APWA) uniform color code:
White: Proposed Excavation.
Pink: Temporary Survey Markings.

Red: Electric power lines, cables, conduit and lighting cables.
Yellow: Gas, oil, steam, petroleum and gaseous material.
Orange: Communications, alarm, signal lines, cables or conduit.
Blue: Potable water.
Purple: Reclaimed water, irrigation and slurry lines.
Green: Sewer and drain lines.

END OF SECTION

SECTION 03 11 00
CONCRETE FORMWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Steel Concrete Reinforcement: Section 03 21 00.
- B. Cast-In-Place Concrete: Section 03 30 00.

1.02 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

1.03 DESIGN REQUIREMENTS

- A. ACI 301, Section 2.1 – Formwork and formwork accessories, General:
 - 1. Add the following to 2.1.1 Description:

The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of "Guide to Formwork for Concrete" (ACI 347-14).
- B. Design Calculations and Drawings: Forms, including shores and reshores, shall be designed by a professional engineer licensed to practice in New York State. The engineer's calculations and drawings shall be signed and sealed by the engineer and kept on the job. Formwork shall be constructed in accordance with the engineer's signed and sealed drawings.

1.05 SUBMITTALS

- A. Shop Drawing:
- B. Product Data: Manufacturer's catalog sheets, specifications, and installation/application instructions for the following:
 - 1. Form systems and ties.
 - 2. Textured (architectural) form linings.
- C. Sample:
 - 1. Textured (Architectural) Form Lining: 2 feet square section, each type.
 - 2. Rustication Strip: 1 foot long section, each profile.

1.06 QUALITY ASSURANCE

- A. Field Examples: Provide formwork for mock-up of cast-in-place concrete. Construct forms using facing materials required to provide specified finishes and textures. Do not proceed with structure formwork until sample panels and forms have been approved by RIOG in writing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Chamfer Strips: Wood, metal, PVC or rubber; 1 inch chamfer, unless otherwise indicated on the Drawings.
- B. Rustication Strips: As required to provide rustication, patterns and profiles indicated on the Drawings.
- C. Facing for Exposed Textured Finish Concrete Surfaces: Oil based concrete stain by Sherwin Williams or approved equal. Color shall be as shown on the plans.

PART 3 EXECUTION

3.01 PREPARATION OF FORM SURFACES

- A. Apply form-coating material in accordance with manufacturer's instructions.

3.02 INSTALLATION

- A. Provide chamfer on all exposed external corners of concrete.
- B. Provisions for Work of Related Contracts: Provide openings in concrete formwork to accommodate Work of related contracts. Obtain information for size and location of openings, recesses and chases from contractor requiring such items.
- C. Shores and Supports:
 - 1. Concrete members subject to additional loads during construction shall be shored in such a manner as will protect the member from damage by the loads.
 - 2. Place shores supporting successive stories directly over those below or so design the shores to transmit the load directly to them.
 - 3. Do not remove shores until the member supported has acquired sufficient strength to safely support its weight and any weight imposed thereon.

3.03 REMOVAL OF FORMS

- A. ACI 301, Section 2.3.2 - Removal of Forms:
 - 1. Change paragraph 2.3.2.5 to read as follows:
2.3.2.5 Forms and shoring used to support the weight of concrete in beams, slabs and other structural members shall be removed in accordance with recommendations in paragraph 3.2.5 of "Recommended Practice for Concrete Formwork" (ACI 347-14).
 - 2. Add the following paragraphs:
2.3.2.8 All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.
 - 3. Change paragraph 2.3.2.7 to read as follows:
2.3.2.7 After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

3.04 RE-USE OF FORMS

- A. Split, frayed, delaminated or otherwise damaged form facing material shall not be used.

END OF SECTION

**SECTION 03 21 00
STEEL CONCRETE REINFORCEMENT**

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 03 11 00.
- B. Cast-In-Place Concrete: Section 03 30 00.

1.02 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the applicable requirements of the following:
 - 1. Specifications for Structural Concrete, ACI 301-16 of the American Concrete Institute (ACI).
 - 2. Manual of Standard Practice, MSP-1-01 of the Concrete Reinforcing Steel Institute (CRSI).

1.03 SUBMITTALS

- A. Shop Drawing: Placing drawings for bar reinforcement.
- B. Sample:
 - 1. Bar Supports: Full size.
 - 2. Fabric Reinforcement: 8 inches square, each wire size.
 - 3. Fabric Reinforcement Supports: 3'-0" long pieces.
 - 4. Reed Clips: 2'-6" long pieces.
- C. Quality Control Submittals:
 - 1. Certificates: Affidavit required under Quality Assurance Article.

1.04 QUALITY ASSURANCE

- A. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
 - 1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
 - a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
 - 2. Fabricator's and Erector's Qualifications Data: Name and experience of fabricator and erector.
- B. The Contractor agrees, that if the value of this contract exceeds \$100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Epoxy-Coated Bar Reinforcement: Deliver, store and handle reinforcement in accordance with fabricator's recommendations and as specified.
 - 1. Use padded or nylon bundling bands.
 - 2. Lift and hoist bundles of bars with nylon or padded wire rope slings at the third points or use spreader bars.
 - 3. Store bars on wood or padded cribbing.
 - 4. Do not drop bars, and do not drag bars over the ground or over other bars.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Epoxy-Coated Bar Reinforcement: ASTM A 775.
 - a. Steel Bars for shade structures: ASTM A615, Grade 60.
 - a. Epoxy Coating Patching Material: ASTM A 775.
- B. Welded Wire Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.
- C. Bar Supports for Epoxy-Coated Bar Reinforcement: Bar supports made of dielectric material compatible with concrete, or wire bar supports coated with dielectric material compatible with concrete for a minimum distance of 2 inches from the point of contact with the reinforcing bar. Reinforcing bars used as support bars and spreader bars shall be epoxy-coated.
- D. Welded Wire Reinforcement Supports:
 - 1. Shall comply with CRSI RB4.1
- E. Tie Wire for Epoxy-Coated Reinforcement: Wire coated with nylon, plastic or epoxy.

PART 3 EXECUTION

3.01 PLACING

- A. Refer to ACI 301, Section 3.3 Execution and modify as follows:
 - 1. Replace the first sentence in paragraph 3.3.2.1 Tolerances- with the following:

Place, support, and fasten reinforcement as shown on the project drawing or approved shop submittal.

 - a. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
 - b. Provide concrete coverage in accordance with ACI 318.
 - 2. Add the following paragraphs:

3.3.2.3.f Bar Reinforcement: In rectangular panels of two-way construction, place the steel in the short direction first with the longer bars on top in the opposite direction.

3.3.2.5.c Welded Wire Reinforcement: Offset end laps in adjacent sheets to prevent continuous joints at ends of sheets.

In concrete slabs supported by steel joists, place welded wire reinforcement approximately 3/4 inch below top surface of the concrete.

3.3.2.11 Fireproofing Reinforcement: Unless otherwise indicated, install reinforcement for concrete fireproofing as follows:

3.3.2.11.a Reinforce concrete flange encasement of steel beams, girders, and columns with reed clips when the flanges are more than 3 inches in width and the thickness of concrete encasement on such flanges is less than 3 inches.

3.3.2.11.b Where the bottom of the concrete encasement on lower flange of steel beams and girders is 12 inches or more below the soffit of adjacent concrete slab, and where no slab occurs, wrap the beams and girders with steel wire at intervals of 12 inches, in addition to the reed clips.

3. Add the following paragraphs:

5.5.12 Epoxy-Coated Reinforcement:

5.5.12.1 Field Bending: Field bending shall be done by cold methods only, and only when ambient and bar temperatures are 40 degrees F or higher. Epoxy coating damaged by field bending shall be repaired, or the damaged reinforcement shall be replaced, in accordance with specified tolerances.

5.5.12.2 Field Repair: Repair damaged epoxy coating with epoxy coating patching material in accordance with the material manufacturer's recommendations. Also coat cut ends, welds, and steel splice members if such procedures are permitted.

5.5.12.3 Tolerances for Coating Damage: Coating damage need not be repaired where the damaged area is less than 0.1 square inch. The maximum amount of coating damage, including repaired and unrepaired areas, shall not exceed 2 percent of the surface area of the bar.

END OF SECTION

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. The work includes providing all labor, equipment, and accessories necessary for or incidental to the completion of all cast-in-place concrete work in accordance with the Contract Documents. The work of this section shall include but not be limited to the following:
1. The construction of footings, grade beams, pile caps, pile fill, foundations, retaining walls, slabs-on-grade, and other concrete structures, curbs and miscellaneous concrete work.
 2. All forms for concrete work included herein.
 3. All reinforcing steel in connection with concrete work.
 4. All concrete finishes, bonding agents, construction joints, etc., required to install the concrete as indicated on the drawings.
 5. Shoring and temporary bracing for concrete work.
 6. Furnishing and setting of sleeves, dowels, bolts, bearing plates, anchor bolts, inserts, anchors, fillers, joint materials, drains, and similar items required in the above concrete work, and setting similar items furnished under other sections.
 7. Cooperation with inspection agency for all required tests and inspections.
 8. All labor and material as may be reasonably inferred to be required to make the work of this Section complete.

1.03 CODES AND STANDARDS

- A. General:

All work shall be done in accordance with all applicable codes and regulations having jurisdiction. Unless specifically specified otherwise herein or by local ordinance, all work shall be done in accordance with the following codes, standards and specifications, and such requirements shall be binding as if specified directly herein. Unless noted otherwise, only the latest editions (at bid date) of the following codes, standards and specifications shall form part of this Specification to the extent indicated by the reference thereto:

1. Building Code of the City of New York.
2. American Concrete Institute (ACI):
ACI - 211.1 "Recommended Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete."
ACI - 214 "Evaluation of Results of Tests Used to Determine the Strength of Concrete."

- ACI - 301 "Specifications for Structural Concrete for Buildings."
- ACI - 304 "Recommended Practice for Measuring, Mixing and Placing Concrete."
- ACI - 305 "Hot Weather Concreting."
- ACI - 306 "Cold Weather Concreting."
- ACI - 308 "Standard Specification for Curing Concrete"
- ACI - 309 "Consolidation of Concrete."
- ACI - 311 "Recommended Practice for Concrete Inspection."
- ACI - 315 "Details and Detailing Reinforced Concrete Construction."
- ACI - 318 "Building Code Requirements for Reinforced Concrete."
- ACI - 347 "Recommended Practice for Concrete Formwork."
- 3. Concrete Reinforcing Steel Institute (CRSI):
 - CRSI - 63 "Recommended Practice for Placing Reinforcing Bars."
 - CRSI - 65 "Recommended Practice for Placing Bar Supports, Specifications and Nomenclature."
- 4. National Ready Mix Concrete Association (NRMCA):
 - "Concrete Plant Standards" and "Truck Mixer and Agitator Standards."
- 5. American Welding Society (AWS):
 - AWS D12.1 "Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction."
- 6. American Society for Testing and Materials (ASTM):
 - ASTM A615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
 - ASTM A775 "Standard Specification for Epoxy-Coated Steel Reinforcing Bars."
 - ASTM A884 "Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement."
 - ASTM A934 "Epoxy Coated Prefabricated Steel Reinforcement Bars"
 - ASTM C31 "Standard Method of Making and Curing Concrete Test Specimens in the Field."
 - ASTM C33 "Standard Specification for Concrete Aggregate."
 - ASTM C39 "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 - ASTM C94 "Standard Specification for Ready-Mix Concrete."
 - ASTM C138 "Test for Unit Weight, Yield and Air Content (Gravimetric of Concrete."
 - ASTM C143 "Standard Test Method for Slump of Portland Cement Concrete."
 - ASTM C150 "Standard Specification for Portland Cement."
 - ASTM C172 "Standard Method of Sampling Fresh Concrete."

ASTM C173 "Air Content of Freshly Mixed Concrete by the Volumetric Method."

ASTM C192 "Standard Method of Making and Curing Concrete Test Specimens in the Laboratory."

ASTM C231 "Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."

ASTM C260 "Standard Specification for Air-Entraining Admixtures for Concrete."

ASTM C494 "Specification for Chemical Admixtures for Concrete."

ASTM C595 "Standard Specification for Blended Hydraulic Cements"

ASTM C618 "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete"

ASTM C989 "Standard Specification for Slag Cement for Use in Concrete and Mortars"

7. American Association of State Highway and Transportation Officials (AASHTO)
AASHTO T260 "Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete Raw Materials."

8. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice"

B. Conflicts:

The Contractor shall conform to requirements of above standards unless specified otherwise herein below. In case of apparent conflict between standards or between standards and the Specifications herein below, the more restrictive requirement, shall apply.

1.04 SUBMITTALS

- A. Details shall be carried out in accordance with the Building Code of the City of New York and where no requirements are set forth in the Code, with the Standard ACI rules, and as shown on plans.
- B. Regardless of any details or instructions shown on the drawings or called for in these specifications, this Contractor will be required to comply with all regulations, rules, requirements and specifications of the Building Code of the City of New York and shall thoroughly familiarize himself with them.
- C. Shop Drawing:
 1. The Contractor shall submit shop drawings, showing reinforcement and all reinforcement bending diagrams and reinforcing steel lists including but not limited to all concrete pile caps, beams, topping slab and miscellaneous areas as shown on the drawings or as required to complete the work.
 2. Shop drawings shall be submitted and prepared in accordance with requirements of General Conditions. Dimensions, bar schedules and bending details shall be shown. Two prints and one transparency (Sepia) shall be submitted for each submission. Details shall be in accordance with ACI rules.
 3. The Engineer's acceptance stamp on shop drawings shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity or quality.

4. Location of conduit runs, pipes and any other inserts or openings in concrete elements.
- D. Mix Design:
- Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Include a complete list of materials including type: brand; source and amount of cement, pozzolan, and admixtures; and applicable reference specifications.
- E. Certification: The contractor shall submit mill test certificates for cement and for steel reinforcement.
- F. Deviations: Should the Contractor desire a deviation from the Contract Drawings or Specifications, or both, the Contractor shall provide written notice of the specific deviation to the Engineer prior to the submittal of shop drawings showing the deviation. Requests for deviations shall be submitted on the Contractor's letterhead. Deviations not identified, or identified only in letters of transmittal or in shop drawings or both, without the required written description on the Contractor's letterhead may not be accepted and shall be sufficient cause for the Engineer to return each shop drawing including such deviations, rejected without further action. Acceptance of shop drawings showing deviations which are not detected by the Engineer during the review process does not mean that the deviation will be allowed. Deviations will be allowed only where specifically permitted by the Engineer in writing.

1.05 JOB CONDITIONS

- A. The General Contractor shall keep himself constantly informed as to the progress of the work in the field, and have his materials and men ready to start work immediately when conditions or work are available or ready, wholly or in part so as not to delay the progress of building work or to interfere with the progress of other work and in any event he shall proceed with such work as directed to maintain the uninterrupted progress of the work.
- B. The Contractor, before commencing work, shall examine all adjoining work on which this work is in any way dependent for proper installation and perfect workmanship according to the extent of this Specification, and shall report to the Engineer any conditions which prevent the Contractor from performing first-class work; no "waiver of responsibility" for defective adjoining work will be considered unless notice has been filed by the Contractor and acceded to in writing by the Engineer before the Contractor begins any part of this work.
- C. Should the bottom of any excavations become frozen, the Contractor shall thaw and put the excavation in such condition as to meet with the approval of the Engineer, and shall also maintain this condition until the concrete has been placed, all at his own expense.

1.06 QUALITY CONTROL

- A. Testing of Concrete Materials:
1. Sand shall be tested for the requirements hereinafter specified.
 2. Colorimetric tests, sieve analysis, sediment tests, and comparative tensile tests shall be made at the start of the job. The Engineer may require additional tests if the concrete compression tests specified fall below the required strength, or if the source of material is changed. These additional tests (if required) shall be at the Contractor's expense.

3. Coarse aggregate shall be tested for the requirements herein before specified. If, after approval, the character of the material changes, it shall be subjected to further tests for approval or rejection. If, after trial, it is found that partly developed quarries, ledges, pit banks or other sources of supply do not furnish a uniform product, or if for any reason the product from any source, at any time, proves to be unsatisfactory to the Engineer, the Contractor shall furnish acceptable material from other sources of supply, at no additional cost to RIOC. Samples and tests shall be taken and made on each 200 tons of fine aggregate to be used in the work, all in accordance with ASTM Standards herein specified and before each allotment is used in the work.
4. All tests required under this Section will be made at a laboratory accepted by the Engineer and the cost of inspections or tests required shall be paid by the Contractor, as indicated in Division 1, Section 014000, Quality Requirements and Testing Services.

B. Concrete Tests:

1. The Engineer shall have the right to order the making of load tests, compression tests on specimens taken from the concrete in place, and any other tests of the controlled inspection concrete structure or any part thereof at any time during the course of construction. If the tests show that concrete tested is not in accordance with specifications, the Engineer may condemn such concrete and order replacement of same with new concrete to his satisfaction.
2. The Contractor shall be responsible for additional architectural or engineering fees on any additional work required when original field tests made in accordance with Building Code of the City of New York have failed.

C. Controlled Inspection Concrete - Test and Supervision:

1. Concrete under this Contract, unless otherwise specified, shall be subject to controlled inspection of the Engineer.
2. Preliminary tests for the purpose of determining concrete mixes, in accordance with the Building Code of the City of New York, and tests of cement and other concrete materials, will be made at the laboratory accepted by the Engineer. The Contractor shall have his representative present when preliminary tests are made. It shall be the responsibility of the Contractor to satisfy himself that concrete mixes, based on the results of the preliminary tests, will produce concrete strengths as required by the Contract.
3. Cement and other concrete materials will be given preliminary tests. Cement samples shall be of the same brand, type, and source, and aggregate samples shall be of the same source, grading, and mineral composition as the materials to be used in actual construction. Approval of concrete materials will be conditional on acceptable results of preliminary tests and approval of the Engineer.
4. The ultimate strength for concrete shall be 4,000 psi minimum, measured at 28 days.
5. From results of the preliminary tests, a smooth curve shall be drawn through the average positions of points plotted, using the 28 day strengths of the test cylinders as ordinates and corresponding water-cement ratios as abscissas. The maximum ratio of water to cement shall include at least four different water cement ratios and at least four specimens for each water-cement ratio. The water-cement ratio to be used in the structure shall correspond to a point on the

curve established by these tests representing a strength of concrete 25% higher than the minimum ultimate strengths called for on the plans. However, if the producer demonstrates to the satisfaction of the Engineer, on the basis of job performance records of the coefficient of variation that the quality of control exercised in the producer's plant warrants a change in the 25% factor, the change may be permitted. In no case, however, shall the concrete used in the work be produced using a water-cement ratio in excess of, or a cement factor less than that corresponding to a point in the strength vs. water-cement ratio curve representing a strength called for on the plans. The design slump shall be as specified by the Engineer and the concrete shall be placed at a slump equal to or less than the design slump. The weight of the aggregate shall be such that the quality and consistency of the concrete shall be suitable for proper placing and required finishes. The concrete proportions used by the Contractor shall be such that daily field cylinder tests made will show that all the concrete used meets the strength requirements of the Contract.

6. The consistency of concrete shall be such that it can be placed without segregation of the materials. Slumps of over 5 inches will not be permitted unless accepted by the Engineer. Whenever it is indicated by inspection or tests that segregation has occurred to an extent that the quality or strength of the concrete has been impaired, the mix shall be revised by decreasing the water content or increasing the cement content or both. Water reducing admixtures may be used.
7. The laboratory shall make a sieve analysis of each shipment of aggregate on the working day previous to its use. In lieu thereof, and subject to the approval of the Engineer, each shipment shall be accompanied by sieve analysis data, which will be subject to check, by the Engineer.
8. In the event that the grading of aggregate is sufficiently different from that used in preliminary tests to indicate that water must be added to the design mix, to obtain the proper plasticity, the testing laboratory will determine from the established water-cement ratio the amount of cement required to be added, subject to the approval of the Engineer.
9. The source of supply of the aggregate shall not be changed during the course of the job without previous notice to the Engineer and the material from any new source shall be subject to acceptance or rejection by the Engineer as based on the tests to be made by the testing laboratory at the Contractor's expense.
10. Should more than one concrete mixing plant be used at the same time for controlled inspection concrete, the Contractor will bear the cost of additional plant inspection.
11. All tests shall be made in accordance with applicable provisions of the Standard Specifications of the American Society of Testing Materials. Costs of this inspection and tests will be borne by the Contractor unless otherwise stated herein. Plastic concrete, as delivered to the site, shall be sampled and tested as indicated below and in the paragraph titled "Evaluation and Acceptance of Concrete" of ACI 318. A minimum of three cylinders shall be made during each concreting cycle of the same mix for every 10 CY of concrete or less per day to verify 28-day strength. Statistical evaluation of compressive test results shall be in accordance with ACI 214.

- a. Slump: In accordance with ASTM C143. Shall be monitored at least once for every 10 CY of concrete or more often if variations are observed. Slump shall be taken prior to addition of admixtures
 - b. Air Content: Test shall be made at the same time that specimens for compression tests are made. Tests shall be made in accordance with ASTM C173 or ASTM C231.
 - c. Calcium Nitrite: Shall be monitored by utility the Michigan Test Method, MTM 607-86 "Test Method for Quality of Calcium Nitrite Corrosion Inhibitor in Plastic Concrete", at least once for every 10 CY of concrete, or more often if variations are observed.
12. If the measured slump, calcium nitrate or air content falls outside the limits specified, a check test shall be made on the same batch or concrete. In the event of a second failure, the load of concrete represented shall be rejected. The replacement of concrete rejected shall be at the expense of the Contractor.
13. The Contractor will engage the services of an independent Inspection Agency to provide the following services in accordance with the applicable provisions of the Building Code of the City of New York and of the Specification:
 - a. Preliminary Tests.
 - b. Taking and testing cylinders of concrete as poured.
 - c. Plant inspection.
 - d. Field inspection of concrete.
 - e. Submitting reports. File and obtain all necessary approvals of all agencies with jurisdiction.
14. The Inspection Agency shall make, transport and test standard 6" diameter by 12" in height specimens as required by applicable building regulations. Three test specimens shall be made for each 10 cubic yards of concrete placed or not less than three cylinders for each day's pour. The test cylinders shall be clearly marked and the system of marking shall have definite sequence. In addition, one set of three cylinders per 30 cubic yards of concrete placed shall be taken directly from the bucket or hopper and clearly identified. The test specimens shall be carefully stored and transported so as not to damage them in any way.
 - a. Records shall be kept identifying each cylinder with the locations of the concrete from which the test cylinders were taken. The method of making, storing and testing specimens shall be in accordance with the procedures set forth in applicable provisions of Standard Specifications of the American Society for the Testing of Materials.
15. The Inspection Agency shall provide a full time qualified inspector at the place of batching who will inspect concrete and materials for concrete.
 - a. The Inspection Agency shall provide adequate equipment for the determination of moisture content and gradation of fine and coarse aggregate. Adjustment shall be made in batch weights to compensate for variation in moisture content. The Inspector shall verify the batch weights.
16. The Inspection Agency shall provide a qualified inspector at the site to see that concrete is thoroughly mixed and properly placed. It shall be the responsibility of

the Inspector to control the consistency of the mix in order that there will be no segregation due to excessive water. The Inspector shall also supervise for proper spading and vibration of the concrete.

17. The Inspection Agency shall submit reports to the Engineer. Five copies of all reports shall be submitted as the tests are completed and a weekly report of the amount of the concrete poured each day shall be submitted. The reports shall also include air temperatures.
18. The laboratory shall prepare Controlled inspection concrete reports listing cylinder test results as required by the Building Code of the City of New York. These records shall be sent to the Engineer for filing.
19. The Inspector shall immediately call to the attention of the Engineer any discrepancies found in the work.
20. The Contractor shall furnish all materials to be tested and shall cooperate and provide every assistance to facilitate the work of inspection and testing.
21. If the results of these tests and inspections indicate that the concrete does not meet the requirements as set forth on the Drawings or in these Specifications or is otherwise unsatisfactory, the Contractor shall proceed as directed by the Engineer. All additional costs resulting from retesting, load testing, replacement of concrete and/or damage to the work of the other trades shall be borne by the Contractor.
22. If, during the progress of the work, it is found that concrete of the required workability and strength cannot be attained with the materials furnished by the Contractor, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired results. Any changes so ordered will be at the Contractor's expense, and no extra compensation will be allowed by reason of such change.

1.07 CORROSION PROTECTION AND DURABILITY

- A. Maximum water soluble chloride ion concentration in hardened concrete at ages 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials and admixtures shall not exceed 0.15% by weight of cement. Tests performed to determine water soluble chloride ion content shall conform to AASHTO T 260.
- B. All concrete shall have a water-to-cementitious material ratio not exceeding 0.40.
- C. All concrete shall have an air content of between 4 ½ and 7 ½ percent.
- D. Special Corrosion Inhibitor Requirements.
 1. Admixture Company shall have a minimum of five years experience utilizing their calcium nitrite corrosion inhibitor.
 2. Minimum (5) projects of similar size.
 3. The contractor shall submit written certification prior to or with submission of the concrete mix that "active corrosion shall be inhibited to 9.9 pounds of chlorides at the reinforcement, per cubic yard of concrete".

PART 2 - PRODUCTS

2.01 CONCRETE

- A ACI 318, for contractor furnished mix design. The minimum compressive strength of concrete at 28 days shall be 4500 psi, unless otherwise indicated. Minimum compressive strength of concrete planned for use at the Shade Structures shall be a minimum of 5000 psi at 28 days, unless otherwise indicated. Add air-entraining admixtures at the mixer to produce between 4.5 and 7.5 percent air by volume. The last admixture shall be the calcium nitrite corrosion inhibitor added at the mixer at the rate of 3 gallons per cubic yard of concrete. Maximum slump shall be determined during testing of proposed mix, based upon providing a maximum water/cement ration of 0.40. The aggregate shall be tested for moisture content prior to mixing each day's batch of concrete and moisture content of aggregate shall be accounted for in determining water-cement ration of concrete. Slump may be increased to 7 inches when superplasticizers are used.

2.02 MATERIALS

A. CEMENT

ASTM C150, Type II, or ASTM C595, Type IP(MS) blended cement, except as modified herein. The blended cement shall consist of a mixture of ASTM C 150 cement and one of the following materials: ASTM C618 pozzolan or fly ash, or ASTM C989 ground iron blast furnace slag. The pozzolan or fly ash content shall not exceed 25 percent by weight of the total cementitious material. The ground iron blast-furnace slag shall not exceed 50 percent by weight of total cementitious material. Use one manufacturer for cement, ground slag, fly ash, and pozzolan.

1. Fly Ash and Pozzolan

ASTM C618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Type N and F. Add with cement.

2. Ground Iron Blast-Furnace Slag

ASTM C 989, Grade 120.

3. All the cement in any container in which part of the cement has become caked or has otherwise deteriorated, shall be entirely removed from the site.
4. All cement shall be stored in waterproof sheds.
5. The Contractor shall submit mill test certificates for cement.
6. The Engineer reserves the right to take samples for testing from any or every lot of cement delivered upon the work. The tests shall be made as determined by the Engineer. The expense incurred in making the tests shall be borne by the foundation Contractor when cement fails to meet specification requirements, but shall be chargeable to the cost of the work when cement does meet Specification requirements.

2.03 ADMIXTURES

- A. Air Entraining Agent: "Darex" by Grace Construction or approved equal. The air entrainment may be checked as per ASTM C260. Acceptable documentary evidence must be submitted with additives showing this material increases the durability of the concrete, and that such material has been in use for not less than 5 years. Air entrained cement is not permitted. All concrete shall have air entraining agent specified above.
- B. Water Reducing Admixture: "Eucon WR-75" by the Euclid Chemical Co., "Pozzolith 200N" by Master Builders, or "Plastocrete 160" by Sika Chemical Corp, or approved

equal. The admixture shall conform to ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.

- C. Water Reducing, Retarding Admixture: "Eucon Retarder-75" by the Euclid Chemical Co., "Pozzolith 100XR" by Master Builders or "Plastiment" by Sika Chemical Corp, or approved equal. The admixture shall conform to ASTM C 494, Type D and not contain more chloride ions than are present in municipal drinking water.
- D. High Range Water-Reducing Admixture (Superplasticizer): "Eucon 37" by the Euclid Chemical Co. or "Sikament" by Sika Chemical Corp, or approved equal. The admixture shall conform to ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
- E. Non-Corrosive, Non-Chloride Accelerator: "Accelguard 80" by the Euclid Chemical Company or approved equal. The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
- F. Corrosion Inhibiting Admixture: "DCI Corrosion Inhibitor" as manufactured by W.R. Grace & Co or approved equal. The admixture shall contain 30 +/-2 percent of calcium nitrite, ASTM C494, Type C.
- G. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
- H. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

2.04 FINE AGGREGATE

- A. Fine aggregate shall consist of sand, stone screening or other inert materials with similar characteristics, or a combination thereof, having clean, hard, strong, durable uncoated grains and free from injurious amounts of dusts, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious substances.
- B. Sand shall meet the following requirements:
 - 1. Colorimetric test in accordance with ASTM Designation C40, current edition, color not darker than Figure 1.
 - 2. Sediment test for excess loam (5% limit).
 - 3. Sieve Analysis as follows:

<u>Sieve No.</u>	<u>% Retained</u>
4	0 to 5
8	10 to 20
16	20 to 40
30	40 to 70
50	70 to 88
100	92 to 98

- 4. Fineness modulus shall be from 2.30 to 2.90

5. No mica, pyrites, or other deleterious materials.
6. The mortar made with this sand must produce tensile strength at least equal to 80% of Ottawa Sand Mortar Briquettes, of the proportion is of one part of cement to three parts of sand.

2.05 COARSE AGGREGATE

- A. Coarse aggregate shall consist of crushed stone or gravel, having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin elongated or laminated pieces, alkali, organic or other deleterious matter.
- B. Particles shall be well graded between the upper and lower limit in order that the voids may be reduced to a minimum for mass concrete (not reinforced). The stone or gravel shall pass a 1.5 inch mesh ring and be retained on a 0.25 inch ring. The stone or gravel shall be graded as follows:

<u>Sieve Size</u>	<u>% Retained</u>
1"	0
0.75"	0 - 10
0.375"	45 - 80
No. 4	95 - 100

- C. The maximum size limit may be raised at the option of the Engineer, whenever the design permits good workmanship with a coarser aggregate.
- D. Aggregate shall be stored on platforms or otherwise, as to avoid the inclusion of foreign materials. Before using, frost, ice and lumps of frozen material shall be removed.

2.06 WATER

- A. Water for concrete shall be clean and free from oil, acid, alkali, organic matter or other deleterious substances, suitable for drinking.

2.07 REINFORCING STEEL

- A. All reinforcing bars shall be deformed new billet steel bars manufactured by the basic open hearth or electric furnace process. Epoxy-coated steel reinforcing bars shall conform to ASTM A775, Grade 60. Splices shall conform to requirements of ACI 318 and ACI 315.
- B. Certified copies of mill reports for all reinforcement shall be submitted before reinforcement is placed.
- C. All bars shall be correctly rolled to section and free from surface defects.

2.08 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

2.09 FORMS

- A. Forms for Unexposed Finish Concrete: Lumber, metal or plywood conforming to U.S. Product Standard PS 1-83; grade marked APA - Plyform "B-B" Class II - Exterior, not less than 3/4" in thickness, mill-oiled and edge sealed.
- B. Concrete Forms for Exposed to View Concrete: Plywood complying with PS 1 APA - "B-B" (Concrete Form) plywood, Class I - Exterior, Exterior Grade or better, mill-oiled and edge sealed, or metal, or metal framed, plywood faced, or other acceptable panel type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- C. The Contractor shall be responsible for the proper design, bracing, shoring and construction of all forms. He shall retain a licensed professional engineer to design such formwork, bracing and shoring in accordance with the requirements of the Building Code.
- D. Form ties including bolts and rods shall be of suitable design and adequate strength for the purpose.
- E. Supports for forms shall consist of wood or steel posts.
- F. Reshores shall be of sound wood of a minimum nominal size of 4" x 4".

2.10 MISCELLANEOUS MATERIALS

- A. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30% solids content minimum and will not yellow under ultraviolet light after 500 hours of test in accordance with ASTM D4887. Compound shall be "Super Aqua Cure VOX" or "Super Diamond Clear VOX" by the Euclid Chemical Company, or "Masterseal" by Master Builders or approved equal. Material to be compatible with concrete fill or floor finish as applicable.
- B. Non-Shrink Grout: The non-shrink grout shall be "Hi-Mod" (non-catalyzed metallic) or "Euco NS" (non-metallic) by the Euclid Chemical Co., or "Embeco 636" (non-catalyzed metallic) or "Masterflow 713" (non-metallic) by Master Builders or approved equal. The grout shall conform to CRD-C-621-83, "Corps of Engineers Specification for Non-Shrink Grout," having a minimum compressive strength of 10,000 psi.
- C. DRAINS:
 - 1. Procure, locate, and install elements of drains which are to be embedded in cast in place concrete.
 - 2. Drains shall be as manufactured by Watts Drainage FD 860 planting area drain, and 3" PVC outlet pipe.

PART 3 - EXECUTION

3.01 PRE-CONCRETE CONFERENCE

- A. At least 14 days prior to start of concrete construction, the Contractor shall hold a meeting to review the detailed requirements of the concrete design mixes and to determine the procedures for producing proper concrete construction.

- B. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:

Contractor's superintendent - Laboratory responsible for the concrete design mix - Laboratory responsible for field quality control - Concrete subcontractor - Ready-mix concrete producers) Admixture manufacturers) - Concrete pumping contractor Representative of other contracts - Engineer.
- C. Minutes of the meeting shall be recorded, typed and printed by the contractor and distributed by him to all parties concerned within five days of the meeting.
- D. The minutes shall include a statement by the admixture manufacturers indicating that the proposed mix design and placing techniques can produce the concrete quality required by these specifications.
- E. The Engineer will be present at the conference. The Contractor shall notify the Engineer or his representative at least two days prior to the scheduled date of the conference.

3.02 MIXING

- A. ASTM C94 Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance. The calcium nitrite-based corrosion inhibitor admixture shall be added at the batch plant immediately after all other concrete admixture has been incorporated into the concrete mixture. The Contractor shall ensure the compatibility of all admixtures used in the concrete mix. The Contractor shall strictly adhere to the manufactures' recommendations regarding the use of admixtures, including storage, transportation, and method of mixing.
- B. All concrete shall be machine mixed.
- C. A water gauge shall be provided to deliver the exact predetermined quantity of water for each batch.
- D. A reliable system must be employed to insure that not less than the predetermined quantity of cement goes into each batch.
- E. The time of mixing shall be not less than one minute with peripheral speed of the drum of about 200 feet per minute for batches of one cubic yard. For larger batches, mixing shall be in accordance with ASTM requirements.
- F. Re-tempering of partly set concrete will not be permitted.

3.03 TRANSIT MIX CONCRETE

- A. Transit mix concrete may be used provided it conforms to the Specifications and tests herein described and ASTM specification C94, current edition, and further provided that the central plant producing the concrete and equipment transporting it are in the opinion of the Engineer of Record suitable for production and transportation of controlled inspection concrete. The maximum elapsed time between the time of the introduction of water and placing shall be one hour. The minimum time of mixing shall be one minute per cubic yard after all the material, including water, has been placed in the drum, and the drum shall be reversed for an additional two minutes. Mixing water shall be added only in the presence of the Inspecting Engineer or the Engineer. Trucks shall not be overloaded in excess of rated capacity as recommended by the manufacturer.

3.04 PLACING OF CONCRETE

- A. All forms must be absolutely clean before starting concreting.
- B. All concrete must be placed as soon as possible after mixing and thoroughly spaded and rammed in place. All possible care is to be exercised to prevent honeycombing and segregation. Placing of a rich mix adjacent to forms will not be permitted.
- C. Locations of construction joints shall be approved by the Engineer. Where new concrete is to be bonded to the existing concrete, the surfaces of the existing concrete shall be swept with a stiff brush or scraped to remove laitance and roughened. The bonding surface after the removal of all loose particles shall be kept wet for an hour, and horizontal surfaces shall be covered with a thin layer of grout just before placing the new concrete.
- D. Structural concrete shall be placed with the aid of a mechanical vibrator. Provide at least two operating vibrators at the site prior to start of placing operation. The vibrators shall be of a type and design approved and shall be capable of transmitting to the concrete not less than 8,000 vibrations per minute. The vibration shall be sufficiently intense to visibly affect the concrete over a definite radius of at least two feet around the point of application, but no applied long enough to segregate the ingredients. Enough vibrators shall be used to cause all concrete to flow or settle readily into place. The vibrators shall be of the internal type, applied directly to the concrete and not through the forms, except sections too thin to permit the insertion of the internal type in which case form vibrators may be employed at the discretion of the Engineer.

Use and type of vibrators shall conform to ACI 309 "Recommended Practice for Consolidation of Concrete."

- E. Concrete if placed in hot weather shall be wet twice daily for the first week after placing. Maximum placing temperature is to be 90 degrees F.
- F. No concrete shall be deposited in water nor on water softened ground.
- G. When depositing concrete at temperature below 40 degrees F, the concrete shall have a temperature of at least 50 degrees F, but not more than 90 degrees F. The concrete shall be maintained at a temperature of at least 50 degrees F for not less than 72 hours after depositing and shall be sufficiently protected so that this temperature can be maintained. No salt or other chemical may be used for such protection.
 - 1. The heating devices used by the Contractor to maintain the specified temperatures shall have baffle plate above, of sufficient size, and a sand bed below, in order to distribute heat.
 - 2. The heating devices shall be so operated that the temperature of the air immediately below the slab forms shall not exceed 100 degrees F. The Contractor shall provide sufficient and suitable thermometers to verify compliance.
 - 3. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixture containing more than 0.05% chloride ions are not permitted.
- H. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Concrete placed in "winter weather" shall be protected against freezing; no concrete containing ice shall be used. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

3.05 FORMS, CENTERING AND FORMWORK AFFECTING WORKMANSHIP

- A. Forms shall be constructed to conform to shape, form, line and grade required, and shall be maintained sufficiently rigid to prevent deformation under load. Studs shall be spaced sufficiently close to prevent deflection of form, material and consequent waviness in surface of concrete.
- B. Wood forms for exposed concrete work shall not be reused more than five times unless in the opinion of the Engineer they may be in good condition to be reused more than this number of times. During the progress of the Work, the City's Inspector shall inspect the exposed concrete work and direct the Contractor as may be necessary as to quality, color, texture, pattern and general workmanship and reuse of formwork.
- C. Joints shall be sufficiently tight to prevent leakage during placing and shall be arranged vertically or horizontally to conform to the pattern of the design for exposed locations. Forms placed on successive units for continuous surfaces shall be fitted to accurate alignment to assure a smooth completed surface free from irregularities. In long spans, where intermediate supports are not possible, the anticipated deflection in the forms due to weight of fresh concrete shall be computed accurately and taken into account in the design of the forms so that finished concrete members will have true surfaces conforming accurately to design lines, planes and elevations. Temporary openings shall be arranged in the forms as required to facilitate cleaning and inspection. Lumber once used in the forms shall have nails withdrawn and surfaced exposed to concrete carefully cleaned before reuse. Forms shall be readily removable without hammering or prying against the concrete.
- D. Form ties shall be of suitable design and adequate strength for the purpose. Bolts and rods that are to be withdrawn completely shall be coated with grease. In walls exposed to view, grout smooth all form tie holes.
- E. Proper shoring shall be provided under the forms for concrete work to support all construction loads. Do not strip beam forms and pile cap forms sooner than seven days after they have been poured.
- F. If any material is used to coat form work to facilitate the removal, this material shall be of such a nature as not to stain or injure the concrete or cause injury to the painted finish to be applied on exposed surfaces of the concrete.
- G. Forms shall be thoroughly cleaned before reusing.
- H. All wood form work, including that used on pile caps and approach slabs, shall be removed.
- I. External and internal corners of slabs and other exposed external corners shall be beveled and chamfered by moldings in the forms, unless the drawings specifically state that chamfering is to be omitted.

3.06 WORK IN CONNECTION WITH OTHER TRADES AND CONTRACTS

- A. Sleeves for all pipe in concrete work where indicated on the Drawings or required shall be provided and installed. Sleeves shall be accepted metal and fiber containers, the fiber wall of the sleeves to be removed before setting standards. Sleeves shall be of size and spacing required to receive the standards. Sleeves shall be set true and properly stayed to prevent displacement during the pouring of concrete. Where sleeves are not set true in proper locations, or are out of alignment, they shall be removed and properly replaced.

- D. All dowels, bolts, anchors and similar items are to be furnished and set as shown on the Drawings to be in work embodied in this Section.
- E. Place all embedded pipes and conduit in accordance with chapter 6 of ACI 318.

3.07 JOINTS AND EMBEDDED ITEMS

- A. Locate construction joints and isolation joints as detailed at approved locations. Make construction joints with straight stops and continuous keys. Reinforcement shall be continuous through construction joints unless otherwise indicated.
- B. Install embedded items accurately in position conforming to approved shop drawings.

3.08 CLEANING

- A. All lumber, forms, metal work etc., shall be removed immediately after completing local areas. The Contractor shall be responsible for removal of all debris from the site.
- B. Immediately remove misapplied sealant and droppings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.

3.09 PROTECTION

- A. The Contractor shall, as a part of his work, provide all barricades and safeguards at all pits, holes, depressions, etc., to prevent injury to workmen and others having business within and about the premises. All safeguards as provided for in the Building Code shall be provided also.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

END OF SECTION

SECTION 03 39 35
CONCRETE SEALER

PART 1. GENERAL

- A. The general provisions and special provisions of these specifications are hereby made a part of this section and will be read by each subcontractor.
- B. Cooperate and coordinate all other trades in executing the work described in this section.

1.1 SECTION INCLUDES

- A. Concrete sealer/densifier/hardener

1.2 REFERENCES

- A. Corps of Engineers Spec: CEGS 03300 4-79.
- B. USDA approved.
- C. Department of Navy, GSA, VA approved.

1.3 SYSTEM

- A. Description: A sealer/densifier/hardener that will react with concrete surfaces to produce a dense, hydrophobic, insoluble, moisture barrier to seal out contaminants, while hardening and densifying surface.
- B. Design Criteria:
 - 1. ACI 302 Class 1 through 4 concrete floors.
 - 2. May be used on Class 5 and 6 floors when used with mineral or metallic aggregate hardeners and toppings, and Class 9, Super-flat floors.
 - 3. Complies with all Federal and State VOC requirements.
 - 4. Independent Test Data, ASTM C 779, Procedure A, reduction of surface abrasion by 50% or more at the 30 minute time interval.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Samples: Furnish representative samples if requested by the Architect.

C. Project Specific Information:

1. Test reports.
2. Certificate of rate of application.
3. Signed warranty.

D. Application Rate: From Installer, based on project requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

B. Installer Qualifications: Minimum 2 year experience installing similar products.

1. Approved in writing by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

B. At the Architect's request, technical personnel shall be available for a pre-job conference to review installation procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver to jobsite in sealed, labeled containers.

B. Store and handle to prevent damage to product and environment.

1.8 PROJECT CONDITIONS

A. 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 recommended limits.

B. Environmental requirements: Comply with applicable VOC and EPA requirements.

1.9 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 WARRANTY

A. Warranty: Provide written warranty signed jointly by applicator, manufacturer and

contractor. Warrant installation for a period of 10 years from date of substantial completion against dusting from abrasion.

PART 2. PRODUCTS

2.1 CURING AND SEALING COMPOUND

- A. Concrete curing and sealing compound. A ready-to-use, acrylic curing and sealing compound for use on new and existing, interior and exterior, horizontal and vertical concrete surfaces. Product shall conform to:
ASTM C 309, Type 1 Class A & B and ASTM C 1315 Type 1 Class A.
AASHTO Specification M 148, Type 1, Class A & B
 - 1. Product:
 - a) Euclid Chemical Company (The); Super Diamond Clear
www.euclidchemical.com

2.2 MANUFACTURER SHALL HAVE ISO 9001 QUALITY CERTIFICATION.

PART 3. EXECUTION

3.1 EXAMINATION

- A. When used on existing concrete, examine concrete surfaces to receive curing and sealing compound. Notify specifier if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

- A. When used on existing concrete, prepare concrete surfaces in accordance with manufacturer's written instructions.
- B. Ensure surfaces are clean and free of standing water.
- C. Remove dirt, dust, oil, grease, sealers, and other materials that may prevent adhesion of curing and sealing compound.

3.3 APPLICATION

- A. For the best cure of freshly placed concrete, apply SUPER DIAMOND CLEAR as soon as possible after finishing operations and/or immediately after the disappearance of the "sheen" of surface moisture.
- B. Apply curing and sealing compound to concrete surfaces in accordance with manufacturer's written instructions.
- C. Apply compound at uniform coverage rate in accordance with manufacturer's written instructions.
- D. Apply as soon as possible after finishing and immediately after disappearance of surface moisture sheen, when used to cure freshly placed concrete.
- E. Do not apply to concrete to receive toppings, epoxy coatings, urethane coatings, or epoxy adhesives.

- F. Do not use as a bond breaker for tilt-up construction.
- G. Do not dilute curing and sealing compound.

END OF SECTION

SECTION 04 05 13
MORTAR AND GROUT

PART 1 GENERAL

1.01 REFERENCES

- A. Standards:
 - 1. Mortar: ASTM C 270, except as otherwise specified.
 - 2. Grout: ASTM C 476.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Portland Cement: Brand and manufacturer's name.
 - 2. Masonry Cement: Brand and manufacturer's name.
 - 3. Lime: Brand and manufacturer's name.
 - 4. Sand(s): Location of pit, name of owner, and previous test data.
 - 5. Color Pigments: Brand and manufacturer's name.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials in a manner which will insure the preservation of their quality and fitness for the Work.
- B. Store cement and lime on raised platforms under waterproof, well ventilated cover.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: One of the following complying with the indicated requirements:
 - 1. Portland Cement: ASTM C 150, Type 1, of natural color or white as required to produce the desired color.
 - a. Fly Ash: Comply with ASTM C593.
 - 1) Recycled Content: Minimum 15 percent pre-consumer recycled content at contractor's option.
 - a) Type 1: 81 g, 15 percent.
 - 2. Masonry Cement: ASTM C 91, of natural color or custom color as required to produce the desired color.
 - a. Fly Ash: Comply with ASTM C593.
 - 1.) Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.
 - a) Type M: 27 g, 5 percent; 108 g 20 percent.
 - b) Type S: 26 g, 5 percent; 102 g, 20 percent.
 - c) Type N: 24 g, 5 percent; 96 g 20 percent.
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Mortar Sand: ASTM C 144, except that for joints less than 1/4 inch thick use sand graded with 100 percent passing the No. 16 sieve.
 - 1. Sand for White Mortar: Natural white sand or ground white stone.
 - 2. Sand for Colored Mortar: Ground marble, granite, or other sound stone, as required to match approved sample.
- D. Grout Sand: ASTM C 404.
- E. Color Pigments: High purity, finely ground, chemically inert, unfading, lime proof mineral oxides specially prepared for use in mortar.
- F. Water: Clean and free of deleterious amounts of acids, alkalis, and organic materials.

2.02 MIXES

- A. Mortar for Unit Masonry: Comply with ASTM C 270, proportion specifications, except limit materials to those specified.
 - 1. Colored Mortar: Proportion color pigments with other ingredients as necessary to match required color, except limit pigments other than carbon black to a maximum of 10 percent of cement content by weight and limit carbon black to a maximum of 3 percent of cement content by weight.
- B. Grout: Comply with ASTM C 476. If grout types are not indicated on Drawings, furnish type (fine or coarse) most suitable for the particular job conditions to completely fill cavities and embed reinforcement and other built-in items.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Refer to sections of Specifications which require mortar and grout.

3.02 MORTAR SCHEDULE

- A. Where mortar types are not indicated on Drawings or specified, use types as follows:
 - 1. Type M for unit masonry below grade in contact with fill materials.
 - 2. Type S for concrete masonry units.
 - 3. Type N for brick masonry units.
 - a. Proportion Portland cement, lime, and sand in a 1:1:6 ratio.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Section Includes:
 - 1. Steel Plates
 - 2. Structural Shapes
 - 3. Cast-in-Place Anchors
 - 4. Structural Fasteners

1.03 RELATED SECTIONS

- A. Section 03 30 00 Cast In Place Concrete
- B. Section 06 10 00 Rough Carpentry

1.04 SUBMITTALS

- A. Product Data for the following:
 - 1. Cast-in-Anchors
 - a. Manufacturer's Product Information
 - 2. Bolts, Nuts, Washers, Etc.
 - a. Manufacturer's Product Information
 - 3. Steel Plates
 - a. Provide Mill Certificate and Material Data from Manufacturer
 - 4. Steel Shapes
 - a. Provide Mill Certificates and Material Data from Manufacturer
- B. Shop Drawings:
 - 1. Show Fabrication and installation of all attachments, including:
 - a. Plans, elevations, sections, details, which show clearly the size, location, and installation methods of all steel connections, including, bolt and anchor locations.
 - b. Include Structural Analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1) Consultants acceptance of shop drawings shall not relieve the Contractor of responsibility for any error, or for furnishing required materials to the proper size, quantity, or quality.
 - 2) Deviations: Should the Contractor desire a deviation from the Drawings or Specifications, or both, the Contractor shall call the specific deviation to the Consultant's attention in writing prior to the submittal of shop drawings showing the subject deviation. Requests for deviations shall be submitted on the

Contractor's letterhead. Deviations not identified or identified only in letters of transmittal or in shop drawings or both, without the required written description on the Contractor's letterhead may not be accepted and shall be sufficient cause for the Consultant to return each shop drawing including such deviations, rejected without further action. Acceptance of shop drawings including deviations not detected by the Consultant shall not relieve the Contractor of responsibility for any error that may occur. Deviations will be allowed only where permitted by the Consultant in writing.

2. Samples for Verification: For each component as required, prepare a material sample of the same thickness and material as shown on approved shop drawings for inspection and approval.
3. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
4. Full-size Mock-Up: approved mock-up may become part of the completed Work if undisturbed at time of Substantial Completion.
5. Mill Certificates: Signed by steel manufacturers, certifying that products furnished comply with requirements.
6. Welding Certificates:
 - a. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1) AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2. PRODUCTS

2.01 MATERIALS

- A. Cast-in Anchors shall be Gr. 36 Heavy Hex Head Threaded Anchors with Zinc Coating conforming to ASTM F 1554. Size shall be as indicated on contract documents. As manufactured by Hilti, or Approved Equal.
- B. Fasteners shall be A307 Grade A Hex Head Bolts & Nuts with Zinc Coating conforming to both ASTM A307 & ASTM A563-A. Washers shall conform to ASTM F844 standards.
- C. Galvanized Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat (as required).
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.02 FABRICATION

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads

PART 3. EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 REPAIRS

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 05 70 00

ORNAMENTAL METAL SCREENS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Basis of Design shall be the drawings and specifications provided as part of the bid documents. Work includes the engineering, submittals, manufacturer, erection and all associated work described in these documents and reference documents provided or discussed at the pre-bid conference or following correspondence. Pre-construction coordination and work on site will include coordination with New York State Parks, its agents and design professionals and the other prime contractors involved in the Project.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.3 SUMMARY

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the ornamental metals, including heavy gauge stainless steel and non-ferrous metal products which are used in building construction for functional, architectural and decorative effects and which are not a part of other metal systems specified in other Sections. The extent of these items is indicated on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Anodized aluminum expanded metal mesh, armatures, hardware, and miscellaneous anodized aluminum items as shown on drawings for shade structures.

1.4 RELATED SECTIONS

- A. 064013 – Exterior Architectural Woodwork
- B. Metal Fabrications

1.5 QUALITY ASSURANCE

- A. General: Work of this section shall be fabricated and installed by an experienced fabricator or manufacturer, who has been engaged in work of equivalent scope and fabrication standards for at least five (5) years. Materials, methods of fabrication, fitting, assembly bracing, supporting, fastening, operating devices and erection shall be in accordance with drawings and specifications, approved shop drawings, and be of highest quality practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected. All work shall be accurately and neatly fabricated, assembled and erected.
- B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not

delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay the work.

- C. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Work that cannot be permanently shop assembled, shall be completely assembled, marked and disassembled in shop before shipment to insure proper assembly in field. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the Contractor for this work to assure that the shop fabricated items will properly fit the field condition. In the event that shop fabricated items do not fit the field condition, the item shall be returned to the shop for correction.
- D. Mockups:
 - 1. Prior to installing any ornamental metal components or assemblies, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.
 - 2. Build mock-ups to comply with the following requirements, using materials indicated for the Work.
 - a. The scope of the mock-up shall be submitted for approval to the Agency in advance of production.
 - b. Provide fully finished typical two-panel connection at joint, base connection, edges and corner
 - c. Notify Resident Engineer 7 days in advance of the dates and times when mockups will be constructed.
 - d. Demonstrate the proposed range of aesthetic effects and workmanship, including installation of construction adhesive at fasteners.
 - e. Obtain Agency approval of mockups before start of Work.
 - f. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

1.6 SUBMITTALS

- A. Shop drawings: Submit for all items of work of this Section, as enumerated under paragraph 1.2, showing locations, layouts, materials, thicknesses, finishes, dimensions, construction, relation to adjoining construction, erection details, profiles, jointing and all other details to fully illustrate the work of this Section. Shop drawings to be fully coordinated with all foundation connections, steel plate connections, wood timber structure, steel tension cables, and metal screens.
- B. Samples: Submit fabricated samples (of sufficient size to fully show construction, materials and finishes) of all items of work as enumerated under paragraph 1.2 herein.
- C. Product Data: Submit manufacturer's, fabricator's and finisher's specifications and installation instructions for products used in ornamental metal work, including finishing materials and methods.

1.7 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to RIOC.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide materials which have been selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Exposed to view surfaces which exhibit pitting, seam marks, roller marks, "oil-canning," stains, discolorations or other imperfections on the finished units will not be acceptable.
- B. Aluminum
 - 1. Basis of Design Expanded Meshes and attachment brackets produced and distributed by Alabama Metal Industries Corporation, AMICO; 1080 Corporate Dr., Burlington, Ontario, L7L 5R6; Attn: Phil Shevchenko; Tel. 800/663-4474 or email pshevchenko@gibraltar1.com
 - a. Material Description: AMICO APEX 03 Aluminum
 - b. Aluminum Grade: 5005 to ASTM
 - c. Finish: Clear anodized
- C. Fasteners: Contact AMICO for attachment recommendations. Furnish basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Provide Phillips flat-head screws for exposed fasteners, unless otherwise indicated. Once installed, secure fasteners with construction adhesive by Loctite or approved equal.
- D. Anchors and Inserts: Either furnish inserts to be set in concrete or masonry work, or provide other anchoring devices as required for the installation of ornamental metal items. Provide toothed steel or lead shield expansion bolt devices for drilled-in-place anchors. Provide galvanized or cadmium-coated anchors and inserts for exterior installations.
 - 1. Provide units with exposed surfaces matching the texture and finish of the metal item anchored.

2.2 FABRICATION

- A. Cutting: Cut metal by sawing, shearing or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, precise, square and free of burrs, without deforming adjacent surfaces or metals.
- B. Holes: Drill or cleanly punch holes (do not burn), so that holes will be accurate, clean, neat and sharp without deforming adjacent surfaces or metals.

C. Connections

1. Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to water. Locate joints where indicated on drawings. Provide connections to allow for thermal movement of metal at locations and by methods approved by Resident Engineer. For work exposed to view, use concealed fasteners (unless welded or other connections indicated) with joints accurately fitted, flush and rigidly secured with hairline contacts.
 2. Welding: Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces so that joint will not be visible; undercut metal edges where welds are required to be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surface will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld splatter and welding oxides from all welded surfaces.
 3. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads, where shown to be exposed to view, shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts of adjacent metal.
- D. Operating Mechanism: Operating devices, mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
- E. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items for architectural metal work to be built into concrete, masonry, or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
- F. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- G. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
- H. Exposed Work: In addition to requirements specified herein or shown on drawings, all surfaces exposed to view shall be clean, and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs and other defects which mar appearance of finished work. Ornamental metal work exposed to view shall be straight and true to line or curve, smooth arises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.

- I. Materials used shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.

2.3 SHOP FINISHING

A. General

1. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated.

B. Stainless Steel

1. Remove or blend tool and die marks and stretch lines into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
3. Bright, non-directional Polish: No. 4 finish on all surfaces exposed to view. This includes all surfaces visible from the inside of the building
4. When polishing is complete, passivate and rinse surfaces. Remove foreign matter and leave surface chemically dry.

2.4 PROTECTION

- A. Provide necessary protection to all exposed surfaces of architectural metal work, so as to prevent damage, staining, discoloration, abrasion, etc., to these surfaces from time of shipment from factory to acceptance of work of this project. Protection shall be provided by wrappings, strippable coatings, or other means. After installation, remove protective paper or strippable coating and clean exposed surfaces, and then provide additional temporary protection to protect architectural metal work from damage during subsequent construction activities. Surfaces which are damaged, stained, discolored, abraded etc., shall be rejected and replaced with new materials, at no cost to RIOG.

2.5 ALUMINUM FRAMING, BRACING, SUPPORTS AND REINFORCEMENTS

- A. Aluminum framing, plate reinforcing, supplementary steel framing or reinforcing, bracket assemblies, and the like required for the support, framing, reinforcing, bracing, etc., of work of this Section shall be of such sizes and shapes as indicated on the drawings, or as required to suit the conditions, and shall be provided with all necessary supports and accessory items such as inserts, hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly and rigidly fasten, anchor or attach work of this Section in place and to the concrete, masonry and other connecting and adjoining work.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ornamental metal work is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. General: Install work of this Section square, plumb, straight, true to line or radius, accurately fitted and located, with flush, tight hairline joints (except as otherwise indicated or to allow for thermal movement), with provisions for other trades, with provisions to allow for thermal movement, with provisions to exclude water where exposed to weather, and with attachment devices as required for secure and rigid installation. It is the responsibility of the Contractor to assure himself that shop fabricated architectural metal items will properly fit the field condition. In cases where the shop fabricated architectural metal items do not fit the field condition, the item shall be returned to the shop for correction.
- B. Attachments
 - 1. All attachment devices shall be of type, size and spacing to suit condition and as approved by Consultant Architect. Provide means necessary for leveling, plumbing and other required adjustments. Attachment devices for work exposed to view shall be concealed, unless indicated otherwise. Where bolts or screws are permitted in work exposed to view, they shall be oval head and counter sunk, unless otherwise noted, with projecting end cut off flush with nuts or adjacent material, and shall match adjacent surfaces.
- C. Tolerances: All work of this Section shall be plumb, square, level, true to radius and correctly aligned within the following limitations:
 - 1. Offset from true horizontal, vertical and design location shall not exceed 1/16" per ten (10) feet of length for any component, not cumulative.
 - 2. Maximum offset from true alignment between abutting components shall not exceed 1/32".
- D. Do not cut or abrade finishes which cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units at Contractor's option.
- E. Restore protective coverings which have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
- F. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.
- G. Field Welding: Comply with AWS Code for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.

3.3 CLEANING

- A. Clean anodized aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

3.4 PROTECTION

- A. Protect finishes of ornamental metal from damage during construction period with temporary protective coverings approved by ornamental metal fabricator. Remove protective covering at the time of Substantial Completion.
- B. Restore finishes damaged during construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Framing with timber.
 - 3. Framing with engineered wood products.
- B. Related Requirements:
 - 1. Section 03 30 00 – Cast In Place Concrete
 - 2. Section 05 50 00 – Metal Fabrications

1.02 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. Timber: Lumber of 5 inches nominal size or greater in least dimension.
- E. Lumber grading agencies, and abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WCLIB: West Coast Lumber Inspection Bureau.
 - 5. WWPA: Western Wood Products Association.

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.04 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.
 4. Power-driven fasteners.
 5. Post-installed anchors.
- C. Qualification Statements: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

- A. Lumber and Timber Products shall be Black Locust as provided by:
1. Locust Lumber Company
 2. Black Locust Lumber Co.
 3. Approved Equal

2.02 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
- B. Maximum Moisture Content of Lumber:
1. Boards: 19 percent.
 2. Dimension Lumber: 19 unless otherwise indicated.
 3. Timber. 19 percent
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.03 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
 3. After treatment, redry boards & dimension lumber to 19 percent maximum moisture content.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

2.04 FIRE-RETARDANT TREATMENT

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame

front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all rough carpentry unless otherwise indicated.
1. Framing for raised platforms.
 2. Framing for stages.
 3. Concealed blocking.
 4. Framing for non-load-bearing partitions.
 5. Framing for non-load-bearing exterior walls.
 6. Roof construction.
 7. Plywood backing panels.

2.05 DIMENSION LUMBER FRAMING

- A. All Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
1. Species and Grade:
 - a. Black Locust, Select Structural, as indicated above for load-bearing construction of same type.

2.06 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Cants.
 4. Furring.

- 5. Grounds.
- 6. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

2.07 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.
 - 2. For pressure-preservative-treated wood, use stainless steel fasteners.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.08 MISCELLANEOUS MATERIALS

- A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- E. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
- F. Do not splice structural members between supports unless otherwise indicated.

- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.02 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

- B. Attach items to substrates to support applied loading.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

- A. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- B. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.04 INSTALLATION OF TIMBER FRAMING

- A. Install timber beams with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Install wood posts using metal anchors indicated.
- C. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.05 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 40 13

EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Basis of Design shall be the drawings and specifications provided as part of the bid documents. Work includes the engineering, submittals, manufacturer, erection and all associated work described in these documents and reference documents provided or discussed at the pre-bid conference or following correspondence. Pre-construction coordination and work on site will include coordination with RIOC, its agents and design professionals and the other prime contractors involved in the Project.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Exterior shade structures with benches.
 - 2. Exterior ornamental wood screen.
 - 3. Shop priming exterior woodwork.
 - 4. Shop finishing exterior woodwork.
- B. Related Sections include the following:
 - 1. 057000 – Ornamental Metal Screens.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcement specified in other Sections.

3. Apply WI-certified compliance label to first page of Shop Drawings.
4. Shop drawings to be fully coordinated with all foundation connections, steel plate connections, wood timber structure, steel tension cables, and metal screens.

C. Samples for Verification:

1. Lumber for exterior wood stain finish, not less than 5 sq. in., for each species, with 1/2 of exposed surface finished.
2. Lumber for transparent finish, not less than 5 sq. in., for each species, with 1/2 of exposed surface finished.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- C. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Certified or Reclaimed Wood: Wood products shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship" or documented as reclaimed.
- C. Wood Products: Use wood of quality as specified from the manufacturers listed below or other manufacturers who can provide the same quality and appearance as approved by the Architect.
 - 1. Black Locust Lumber: www.blacklocustlumber.com
 - 2. Or approved equal

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Nonpressure Process: Comply with AWP A N1 using the following preservative for woodwork items indicated to receive water-repellent preservative treatment:
 - 1. Water-Repellent Preservative: Formulation made specifically for dip treatment of woodwork items and containing 3-iodo-2-propynyl butyl carbamate (IPBC) complying with AWP A P8 as its active ingredient.
 - 2. Water-Repellent Preservative/Insecticide: Formulation made specifically for dip treatment of woodwork items and containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chlorpyrifos as its active ingredient, both complying with AWP A P8.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements of AWP A C20 (lumber) and AWP A C27 (plywood), exterior type.
 - 1. Fire-Retardant Chemicals: Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 - 3. Kiln-dry materials before and after treatment to levels required for untreated materials.
 - 4. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.

5. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

2.4 INSTALLATION MATERIALS

- A. Blocking, Shims, and Nailers: Softwood or hardwood lumber , fire-retardant treated, kiln dried to less than 15 percent moisture content.
- B. Nails: stainless steel.
- C. Screws: stainless steel.
 1. Provide self-drilling screws for metal framing supports, as recommended by metal-framing manufacturer.
- D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.5 FABRICATION, GENERAL

- A. Wood Moisture Content: 9 to 15 percent.
- B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 1. Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

2.6 EXTERIOR WOOD SHADE STRUCTURE FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Wood Species: Reclaimed Black Locust
 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.
 2. Use solid continuous pieces as shown on the drawings

- C. Woodwork for Transparent Finish: Shop seal woodwork for transparent finish with stain (if required), other required pretreatments.
- D. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.7 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. Grade: Premium.
- C. General: Entire finish of exterior architectural woodwork is specified in this Section. To greatest extent possible, finish architectural woodwork at fabrication shop. Defer only final touchup and cleaning until after installation.
- D. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.
- C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.
- B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPAC M4.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- G. Bench and Screen: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Install with no more variation from a straight line than 1/8 inch in 96 inches.
- H. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Door hardware for the following:
 - a. Swinging doors.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.
- C. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.
 - 1. Sample Size: Full-size units or minimum 2-by-4-inch Samples for sheet and 4-inch long Samples for other products.
 - a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- D. Other Action Submittals:
 - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.

- b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - c. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Fastenings and other pertinent information.
 - 5) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 6) Mounting locations for door hardware.
 - 7) List of related door devices specified in other Sections for each door and frame.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Resident Engineer's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATION SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor and Resident Engineer about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high. (See Ornamental Metals for thresholds)
 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- D. Keying Conference: Conduct conference at Project site to comply with requirements. In addition to Resident Engineer, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system.
- E. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- F. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- G. Deliver keys to manufacturer of key control system for subsequent delivery to Agency Maintenance and Operations Division.
- H. Deliver keys and permanent cores to Agency Maintenance and Operations Division.

1.7 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Resident Engineer's security consultant.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Concealed Floor Closers: 5 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Resident Engineer's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as on Drawings to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Hardware Set 1, Doors 1, 2 & 3:
 - 1. Hinge:
 - a. 5BB1.NRP 4.5x4.5 hinge (3) by Ives or approved equal.
 - b. Finish: US32
 - 2. Closer:
 - a. 1260 closer (1) top jamb (push side) mounting by LCN or approved equal.
 - b. Finish: 689
 - 3. Pull Plate:
 - a. 8303-0 (1) L-mount by Ives or approved equal.
 - b. Finish: US32
 - 4. Push Plate:
 - a. 8200 (1) by Ives or approved equal.
 - b. Finish: US32
 - 5. Door Drip Guard:
 - a. 8112A11 (1) by McMaster Carr or approved equal.
 - b. Finish: Aluminum
 - 6. Weatherstripping:
 - a. 14775A37 (1) by McMaster Carr or approved equal.
 - b. Finish: Anodized Aluminum
 - 7. Lockset:
 - a. B500 – 22-003 with compatible thumb turn and occupancy indicator (1) by Schlage or approved equal.
- C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Hardware Sets Schedule. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements.

2.2 FABRICATION

- A. **Manufacturer's Nameplate:** Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Resident Engineer.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. **Base Metals:** Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. **Fasteners:** Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. **Concealed Fasteners:** For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. **Spacers or Sex Bolts:** For through bolting of hollow-metal doors.
 - 3. **Gasketing Fasteners:** Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.3 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. **Appearance of Finished Work:** Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated above.
- D. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- E. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09 92 00

BREATHABLE MASONRY COATING

PART 1. GENERAL

- A. The general provisions and special provisions of these specifications are hereby made a part of this section and will be read by each subcontractor.
- B. Cooperate and coordinate all other trades in executing the work described in this section.

1.1 SCOPE OF WORK

- A. The work described in this section consists of furnishing all labor and materials and performing all operations in connection with the cleaning and/or surface preparation and painting on the existing masonry surfaces.
- B. Coordination and compatibility with cleaning and preparation treatments specified elsewhere.
- C. A water-based breathable silicone resin emulsion paint (SREP) developed for application to new or old masonry surfaces and compatible for use over the existing paint coating is also described. Applied by brush, roller, or low pressure spray, the paint system dries to a flat finish.

Surfaces properly treated with the specified coating system will be rendered uniform in color and water repellent without substantial reduction of the treated masonry's natural water vapor permeability. The coating provides superior protection against atmospheric staining, efflorescence, mildew staining and paint failure that results from moisture intrusion.

- D. Use of nonproprietary surface prep materials, primers, surface treatments or paint coatings other than those specified herein will not be permitted.

1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers shall have been regularly engaged and specializing for the preceding three (3) in the formulation, manufacture and distribution of surface treatments and silicone emulsion paint coatings for masonry substrates.
- B. Contractor Qualifications: Contractors shall have been regularly engaged and specializing for the preceding three (3) in the application of surface treatments to masonry facades. Contractors shall possess all necessary licenses, certifications, or other written approvals as required by the manufacturer supplying coating materials necessary for execution of the work specified in this section.
- C. Regulatory Requirements: All activities shall be in compliance with relevant local codes and governmental regulations.
- D. Tests and Approvals:
 - 1. Test areas of at least 100 square feet will be selected by the Commissioner to represent the appearance of the final project.

2. The test areas will be cleaned and prepared as necessary using specified methods for inspection and approval of the Commissioner or project manager prior to application of the coating samples.
3. Samples of the coating will then be applied to test areas on each surface exposure on representative surface conditions, employing techniques and equipment proposed for overall application.
4. Adjacent surfaces not to be treated will be tested for possible detrimental effect or aesthetic alteration created by exposure to the specified finish coat. Protect as necessary.
5. Test applications will be carefully monitored to determine the appropriate square foot coverage rates to be maintained throughout the job application.
6. The testing process shall be carried out by the actual applicators designated to apply the general treatment. Testing shall be supervised by a representative of the material manufacturer. Tests shall serve as a review of the appropriate application procedures and consumption rates.
7. The Commissioner or project manager will approve all test areas and application procedures prior to the state of full-scale operations.
8. Test procedures shall include evaluation of materials and techniques proposed for protection of surrounding and adjacent nonmasonry surfaces from treatments.
9. Completed and approved test areas shall serve as the standard by which all subsequent work in this section will be judged.

1.3 SUBMITTALS

- A. Product Information: Contractor shall review all written product data sheets and container labels supplied by the product manufacturer.

Contractor shall review all special requirements outlined in this document and those outlined by the Commissioner. The contractor shall verify in writing, to the appropriate representative of the Commissioner, that such product information and special requirements are understood before initiating general application.

- B. Shop Drawings: Shop drawings for the fabrication and installation of painted exterior graphic. Include elevations at not less than 1/2" to 1'-0" scale. Lay out building graphic on all building elevations as shown in contract drawings.
- C. Test Reports: When directed by the Commissioner, the contractor shall submit laboratory test reports confirming the physical and chemical characteristics of materials used in the performance of work outlined in this section.
- D. Warranty Test Reports: If a 10 Year Material & Labor Warranty is required, follow the manufacturer's procedures for measuring, documenting and reporting the comparison of treated and untreated test areas. Test the rates of water penetration before application of breathable masonry coating, and when the coating application is completed. Following manufacturer's instructions for application of breathable masonry coating, test adhesion using ASTM D-3359 Standard Method for Measuring Adhesion by Tape Test. Submit test reports to the Commissioner.

1. Pretreatment Rilem Tube Tests:

- a. Rilem Tube Testing: prior to installation of the water repellent, conduct Rilem Tube test using the procedure provided by the coating manufacturer and report the results for untreated masonry to the Commissioner.
- b. Fill the tube with water to appropriate level; wait 20 minutes and then record the amount water absorbed by the substrate.
- c. Use 5.0 mL tubes for testing brick, stone and cured concrete; use 60 mph tubes for testing concrete block. A sales manager or manufacturer's representative of the water repellent company should conduct Rilem tube tests.

2. Post-treatment Rilem Tube Tests:

- a. Following installation of the water repellent, conduct Rilem Tube test using the procedure provided by the coating manufacturer and report the results for treated masonry to the Commissioner.
- b. Fill the tube with water to appropriate level; wait 20 minutes and then record the amount of water absorbed by the substrate.
- c. Use 5.0 mL tubes for testing brick, stone and cured concrete substrates; use 60 mph tubes for testing concrete block. A sales manager or manufacturer's representative of the water repellent company should conduct Rilem tube tests.

3. Adhesion Test: ASTM D-3359 Measuring Adhesion by Tape Test. Allow coating to cure for no less than 14 days before conducting field adhesion tests.

E. Other Submittals:

1. Procedures: Contractor shall document, in writing, the procedures used in the preparation of the test area(s) described under Tests and Approvals of this section. Include the following information:
 - a. Environmental conditions; including temperature, relative humidity, wind conditions and sun exposure.
 - b. Finish coats used, including number of applications and methods of applications.
 - c. Application equipment used, including application pressures.
 - d. Accessory materials used.
 - e. Color samples to match digital files provided by the Commissioner.

F. Upon approval of such documentation by Commissioner, the submitted procedures and test results will serve as the standard by which all subsequent work in this section will be judged.

G. Inspection Reports: Before initiating general application, the contractor shall submit a report of his inspection of any exterior pre -cast and poured in place concrete designated to receive treatment to the appropriate representative of the Commissioner. This report shall include the following information:

1. Inspection methods employed.
2. Description of existing conditions, including any staining or deposits present on

the concrete surfaces which might affect the appearance or performance of the specified treatments.

3. Description of any additional work necessary to effectively carry out the treatment specified in this section.
4. Cost proposals for execution of such additional work.
5. In the event that recommendations for surface preparations and coating involve materials and procedures not specified in this section or accompanying sections, include with the inspection report all relevant product data, procedures and test reports.

Following submittal of the above-described documents, the contractor shall request a written "Order to Proceed" from the Commissioner before initiating general application of the specified treatments to each façade designated to receive treatment.

1.4 WARRANTY

- A. The Contractor shall warrant that all Breathable Masonry Coating Work executed under this Section will be free from defects in materials and workmanship for a period of two (2) years from date of acceptance of the Project, and he shall remedy any defects in the Breathable Masonry Coating Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Materials to be used in performance of work outlined in this section shall be delivered to the site in the manufacturer's original, unopened containers. Each container shall bear the manufacturer's label in legible condition.
- B. Storage: All materials shall be stored at the job site in a secure storage area approved by the Commissioner. Protect the materials from adulteration by infiltration. Materials shall be stored off-ground and, as required, under cover.

Conform to any additional recommendations of the manufacturer regarding storage and handling of the materials.

- C. Replacements: In the event of adulteration of the materials, or the rejection of the materials by the Commissioner for nonconformance, the contractor shall be responsible for replacing such materials at no additional cost and in a manner causing no delay in the commencement and performance of the work.

Make assurance that the storage life of the breathable masonry coating has not been exceeded. a limited storage life of one year. The breathable masonry coating should be stored in sealed containers, kept away from extreme heat and protected from freezing.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Surfaces designated to receive treatment with BMC® II must possess a surface temperature of not less than 40° F and not greater than 85° F.

2. Treatments shall not be applied during rain, to wet surfaces or when there is a chance of rain within 24 hours after application unless such surfaces are properly protected from rain waters.
 3. Cleaning materials and treatments shall not be applied when winds are sufficient to carry airborne chemicals to unprotected surfaces.
- B. Occupancy:
1. Contractor shall arrange with the Commissioner for means of access to the premises and necessary utilities, space for storage of materials and equipment, etc.
 2. Contractor shall provide covered access to portions of the building undergoing the specified treatment at all times for designated employees of the Commissioner and the product manufacturer.

PART 2. PRODUCTS

2.1 MANUFACTURER(S)

- A. Surface preparation cleaner specified elsewhere, and silicone resin emulsion paint, shall be produced by the same manufacturer.
- B. Use of materials other than those outlined in this section shall require the advance, written approval of the Commissioner.

2.2 MATERIALS

- A. Breathable Masonry Coating – Color coat:

Breathable masonry coating will be a silicone resin emulsion paint (SREP) with the protective power of breathable water repellents. The coating must allow water vapor escape from masonry, while stopping destructive liquid water from entering and preserving the masonry's appearance.

1. Acceptable Products
 - a. Basis of Design: Prosoco Breathable Masonry Coating II

pH: 9.0 -10.0
FLASH POINT: > 200 degrees F (> 93 degrees C) ASTM D 3278
FREEZE POINT: 32 degrees F (0 degrees C) Do not freeze.
BINDER: Silicone resins, acrylic resins
GENERIC TYPE: Silicone emulsion color coating
DRYING TIME: (Normal 77 degrees F, 50% Relative Humidity)
Touch: 45 minutes
Recoat: 24 hours
TYPE OF CURE: Coalescence
REDUCTION SOLVENT: Water
CLEAN UP SOLVENT: Water
VOC CONTENT: Complies with all known national, state and district AIM VOC regulations.

- b. Alternate Manufacturers:
 - a. Edison Coatings, Inc Elastowall 351
 - b. Tnemec Enviro-Crete 156 & 157 & Tnemec-Cryl Series 6.
 - c. Or approved equal meeting the same standards.
 - 2. Color and Artwork
 - a. Digital files will be provided to the successful bidder for their use in laying out the work.
 - b. A precise color match will be required.
- B. Graffiti Coatings:
 - 1. Basis of Design: Prosoco "Sacrificial Coating SC-1"
 - 2. Alternate Manufacturers:
 - a. Edison Coatings, Inc Aquathane UA-210.
 - b. Fox Industries FX-441
 - c. or approved equal.

2.3 OTHER MATERIALS

- A. Other materials not specifically described, but required for complete and proper performance of work outlined in this section, shall be new, first quality of their respective kinds, and subject to approval by the Commissioner.

PART 3. EXECUTION

3.1 INSPECTION

- A. Verify that the work outlined in this section can be carried out in accordance with all relevant local codes and governmental regulations, and the Contract Documents.
- B. Submit an inspection report as described under Other Submittals: Inspection Reports of this section, reviewing the condition of the exterior concrete and the work proposed in this section. Provide platforms, scaffolding, ladders and tools required to perform comprehensive inspections.

3.2 PROTECTION

- A. Nonmasonry surfaces, wooden and/or painted surfaces not intended for treatment shall be protected with drop cloths, sheets of polyethylene, or other proven protective materials firmly fixed and sealed to the surface.
- B. Provide for the removal and subsequent reinstallation of surface mounted items where practical. Where not practical, such items shall be protected in place.
- C. Adjoining glass, metal and painted surfaces shall be protected from overspray and splash of the coating. Inadvertent splashes should be removed before the solution has dried on the surface.

3.3 PREPARATION

- A. Surface cracks and voids of more than 1/16" shall be re-pointed, patched or caulked as

specified prior to application of the primer.

- B. All caulking and sealants shall be in place and thoroughly cured prior to application.
- C. The concrete surface(s) shall be cleaned free of all surface dirt, efflorescence, dust, oil or other surface contaminants, using the methods and surface preparation cleaner specified. Allow prepared surfaces to dry thoroughly before application of the color coat.
- D. All existing painted surfaces intended to be re-coated shall first be power washed using cold water pressure rinsing equipment. Equipment shall be adjustable and allow for pressures of 800 psi to 1000 psi at the wall, with 4-6 gallons of water per minute with a 15- 45° tip. This process is designed to remove all loose surface debris, insects, dust, dirt, and loose and peeling paint.
- E. Following pressure rinsing, surfaces shall be cleaned with a compatible masonry cleaner as specified elsewhere and described below.
- F. Installers shall inspect all surfaces to verify that they are properly prepared to receive the specified coating system. On-site tests should be conducted to ensure proper adhesion. Application shall not proceed until all unsatisfactory conditions have been corrected.
- G. Coordinate necessary closure of the building entrances, walkways, and other pedestrian areas with the Commissioner.

3.4 EQUIPMENT

- A. 4" – 6" nylon brushes with 3 ¾ " exposed stack
- B. Application rollers with ¾ - 1 ¼" nap.
- C. Personal protective gear, including safety goggles, rubber gloves, plastic or rubber rain suits, etc., as recommended in the manufacturer's product literature and label and Material Safety Data Sheet.
- D. Conventional airless spray equipment suitable for applying acrylic latex-type paints.
- E. High pressure rinsing equipment. Equipment must be adjustable and provide from 800 psi to 1000 psi with 4 to 6 gallons of water per minute delivered through a 15 - 45° fan spray tip.

3.5 CLEANING PREPARATION

- A. Clean and prepare masonry surface as required by the manufacture of the breathable masonry coating and as part of masonry cleaning specifications elsewhere.

Before applying, read "Protect" and "Precautionary Measures" sections in the manufacturer's Product Data Sheet for surface cleaner. Use in concentrate on severe staining, or dilute with up to 10 parts water on light staining. Refer to Product Data Sheet for recommended dilution for intended use.

1. Prewet the surface with clean water.
2. Apply the cleaner to all surfaces designated to receive breathable masonry coating using a brush or low-pressure spray.
3. Let the cleaner stay on the surface 1-10 minutes. Do not allow cleaner to dry. If drying occurs, lightly wet surfaces with fresh water.

4. Re-apply the cleaner and scrub heavily soiled areas using a plastic or brass bristle scrub brush.
5. Rinse the surface thoroughly with clean water. Remove all cleaner, loose material and debris.
6. Repeat steps 1 through 5 if necessary.

Note: and reapply the cleaner in a gentle scrubbing manner.

3.6 APPLICATION

Before applying, read "Protect" and "Precautionary Measures" sections in the manufacturer's Product Data Sheet for breathable masonry coating. Refer to the Product Data Sheet for additional information about application. Do not dilute or alter except for use in sprayers. The concentrate may be thinned with up to 5 percent fresh water, based on surface and drying conditions, and equipment.

Tinting

The breathable masonry coating must be compatible with an appropriate color system for achieving predictable color matches.

Application Instruction

1. Mix tinted base coat well.
2. Use roller, brush or airless sprayer to apply a smooth, uniform coating, 7 wet mils thick. Work from the top down. Brush out runs or drips. Back roll spray applications for proper adhesion and good coating performance.
3. Let first coat dry 24 hours
4. Reapply. The second coat should be 4 wet mils thick.
5. Protect from rain for at least 6 hours or until coating is thoroughly dry. Coating dries completely in 48 hours.

3.7 FIELD QUALITY CONTROL

- A. Inspection: Inspect the work with the Contractor, Commissioner, applicator, and manufacturer's representative, and compare with test panel results approved by the Commissioner. Determine if the substrates are suitably protected by the water repellents.
- B. Manufacturer's Field Services: Provide the services of a manufacturer's authorized field representative to verify specified products are used, and protection, surface preparation, and application of water repellents are in accordance with the manufacturer's written instructions and the test panel results approved by the Commissioner.

END OF SECTION

SECTION 10 14 23

SIGNS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Fabrications and installation of ADA parking signs in accordance with the plans

1.01 REFERENCES

- A. Americans with Disabilities Act - 1990.
- B. ICC/ANSI A-117.1 - Specifications for Sign Requirements for the Physically Handicapped.

1.02 SUBMITTALS

- A. Shop Drawings: Show fabrication and mounting details for each sign type and copy specified. Include sign designs, dimensions, copy style, and copy heights.
 - 1. For signs supported or anchored to permanent construction provide setting drawings for anchor bolts and other anchors to be installed under other sections.
- B. Product Data: Catalog sheets, specifications, and installation instructions for each sign type and mounting type specified.
- C. Samples:
 - 1. Full size of the ada signs and copy type specified including mounting accessories. These samples will be returned and, if approved, may be used in the Work.
 - 2. Color Samples: Manufacturer's standard colors for sign material and finishes specified.
- D. Quality Control Submittals:
 - 1. Sign Fabricator Qualification Data: Certified statement from the fabricator indicating the capacity and number of years products similar to those specified for the Work have been produced.
- E. Templates: Provide full-size spacing templates for individually mounted dimensional letters and numbers.

1.03 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: The firm manufacturing the signs shall have been regularly producing signs similar to those specified for the Work, for a minimum of 5 years. The firm shall also have sufficient production capacity to produce the quantity of sign units required without causing delay in the Work.
- B. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

1.04 PROJECT CONDITIONS

- A. Do not install the sign units until all other finishing operations, including painting, have been completed unless otherwise directed.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sign units to Site with protective covering in place.
- B. Leave protective covering on sign units until completion of installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Acrylic Sheet: Cast methyl methacrylate monomer plastic sheet, minimum flexural strength of 16,000 psi (ASTM D 790), minimum allowable continuous service temperature of 176 degrees F.
 - 1. Transparent (Clear) Sheet: Colorless sheet with matte finish and minimum light transmittance of 92 percent (ASTM D 1003).
 - 2. Translucent Sheet: White translucent sheet of density required to produce uniform brightness and minimum halation effects.
 - 3. Opaque (Colored) Sheet: Colored sheet as selected from manufacturer's standard colors and finishes, unless otherwise indicated.
 - 4. Thickness: 1/8 inch, unless otherwise indicated.
- B. Aluminum Sheet: Alloy and temper recommended by the sign manufacturer, with minimum strength and durability of 5005-H15 (ASTM B 221).
- C. Stainless Steel Sheet: AISI Type 302 (ASTM A 666).
- D. Bronze Plate: Copper alloy UNS C83000, Muntz metal, 60 percent copper.
- E. Opaque Coating: Sign manufacturer's standard or recommended non-fading inks, paints or enamels.
- F. Mounting Materials:
 - 1. Mechanical Mounting (MM): Sign manufacturer's standard or recommended full threaded screws with tamper resistant heads.
 - a. Concrete, Masonry, and Plaster Substrates: Furnish plastic anchors with screws.
 - 2. Tape Mounting (TM): Sign manufacturer's standard or recommended double sided foam tape intended for substrates involved.
 - 3. Sealant Mounting (SM): Sign manufacturer's standard or recommended acrylic or silicone sealant type adhesive intended for substrates involved.
 - 4. Plate Mounting (PM): Minimum 1/8 inch acrylic or styrene plate with predrilled holes, full threaded, Phillips flat or oval headed screws, plastic anchors, and double-sided foam tape or sealant adhesive.

2.02 GRAPHIC PROCESS TYPES

- A. ADA Parking Sign: Dimensional Process (D): Machine cut letters, numbers, symbols, and other graphic devices to produce precisely formed copy raised to a

uniform height of 1/8 inch with sharply formed edges. Chemically weld copy to sign panel face.

1. Comply with ADA requirements.
2. Copy: White acrylic.
3. Copy: Black acrylic.
4. Sign Panel Face: Colored (opaque) acrylic sheet.
 - a. Color: As indicated, or if not indicated as selected from the manufacturer's standard colors.
5. Sign Panel Face: Clear non-glare acrylic sheet.
6. Sign Panel Face: Clear non-glare acrylic sheet with opaque coating applied to back side of panel.
 - a. Opaque Coating Color: As indicated, or if not indicated as selected from the manufacturer's standard colors.

2.03 ADA SIGN PANEL CONFIGURATION

- A. Comply with requirements indicated for each sign type and copy. Produce smooth, even, level, sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
- B. Unframed Panel Signs: Fabricate sign units with edges mechanically and smoothly finished to conform with the following conditions:
 1. Edge Condition: Square Cut.
 2. Edge Condition: Beveled.
 3. Edge Condition: Bull nose.
 4. Edge Color: Same as copy.
 5. Edge Color: Same as background.
 6. Corner Condition: Square.
 7. Corner Condition: Rounded to radius indicated or directed.
 8. Border: None.
 9. Border: 3/8 inch wide, raised 1/32 inch.
- C. Framed Panel Signs: Fabricate frames to profile indicated to conform to the following conditions:
 1. Frame Material: Aluminum.
 2. Frame Material: Acrylic.
 3. Frame Material: Injection molded ABA plastic.
 - a. Finish and Color: As indicated, or if not indicated as selected from the manufacturer's standard colors.
 4. Corner Condition: Square.
 5. Corner Condition: Rounded to radius indicated or directed.
- D. Copy Style:
 1. Style 1: Helvetica Medium, upper case, 3/4 inch height, with Grade 2 Braille below copy.
 2. Style 2: Helvetica Medium, upper case, 3/4 inch height, with appropriate pictogram to match lettering and Grade 2 Braille below copy.
 3. Style 3: Helvetica Medium, upper case, 3/4 inch height, with appropriate pictogram to match lettering, international handicapped accessibility pictogram, and Grade 2 Braille below copy.
 4. Style 4: Helvetica Medium, upper case, 3/4 inch height, with handicapped accessibility pictogram and Grade 2 Braille below copy.
 5. Style 5: Helvetica Medium, upper case, 3/4 inch height.
 6. Style 6: Helvetica Regular, upper case, 3/4 inch height.
 7. Style 7: Sans Serif, upper case, 3/4 inch height.

8. Style 8: Simple Serif, upper case, 3/4 inch height.

2.04 FABRICATION

- A. Fabricate sign units of graphic process, design, copy, dimensions and color indicated or specified.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine surfaces to receive the signs for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install the work of this Section in accordance with the sign manufacturer's printed installation instructions, except as otherwise indicated or specified.
- B. Secure sign units to surfaces and locations shown on the Drawings with mounting location and mounting method specified.

3.03 CLEANING AND PROTECTION

- A. Do not remove protective coverings until directed.
- B. Clean sign units when directed.

END OF SECTION

SECTION 12 93 10

SITE FURNISHINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This Section includes the following site and street furnishings:

1. Bench Type A
2. Bench Type B
3. Lounge Chair
4. Picnic Table
5. Picnic Table, ADA compliant
6. Waste Receptacles
7. Pet Waste Station
8. Drinking Fountain with Handwashing Station
9. Pet Fountain
10. Bicycle Rack
11. Hot-Coal Bin
12. BBQ Grill
13. Welcome Sign
14. Dog Park Agility Equipment

1.03 RELATED WORK

- A. Products furnished, but not installed under this section, include anchor bolts, cast-in-place concrete and concrete footings.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.
- B. Sample: For Initial Selection for units with factory-applied color finishes.
- C. Sample: For Verification for each type of exposed finish required, prepared on Samples of size indicated below.

1. Size: Not less than 6-inch-long linear components and 4-inch square sheet components.
- D. Mockup: Mockup sample required to display Welcome sign perforations. Samples shall display graphic and text quality of perforated panel sample size shall be min. 1ft square. Coordinate with Landscape Architect on section of sign that best displaces areas for approval.
- E. Schedule: For site furnishings. Use same designations indicated on Drawings.
- F. Certification: Certifying Ductile Iron used in bench standards shall be submitted. The certificate shall be on foundry letterhead, dated and signed by the manufacturer with the Contract No., Contractor name, and Class of Ductile Iron provided.
- G. Material Certification: For site and street furnishings, signed by manufacturers.
- H. Welcome Sign Shop Drawings:
 - a. Contractor to provide fully coordinated and signed and sealed shop drawings showing all of the following:
 - 1) Foundation sizing, reinforcing, and connections.
 - 2) Hollow structural steel connections, steel base plates connections and anchorage.
 - 3) Landscape architect to provide the sign graphic to manufacturer for incorporation into shop drawing submittal.
 - 4) Submit the graphic perforation patterns and the minimum and maximum sizing. Contractor to provide NY STATE professional RIOC's Representative stamped structural calculations for the entire sign system.

RIOC's Representative's acceptance stamp on shop drawings shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity or quality. Shop drawing shall also include the proposed powdercoat application for the hollow structural steel framework.

Deviations: Should the Contractor desire a deviation from the Drawings or Specifications, or both, the Contractor shall call the specific deviation to RIOC's Representative's attention in writing prior to the submittal of shop drawings showing the subject deviation. Requests for deviations shall be submitted on the Contractor's letterhead. Deviations not identified or identified only in letters of transmittal or in shop drawings or both, without the required written description on the Contractor's letterhead may not be accepted and shall be sufficient cause for RIOC's Representative to return each shop drawing including such deviations, rejected without further action. Acceptance of shop drawings including deviations not detected by RIOC's Representative shall not relieve the Contractor of responsibility for any error that may occur. Deviations will be allowed only where permitted by RIOC's Representative in writing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:

1. Bench Type A – Folk seat with Armrests model no. 4914A as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Surface Mounted
 - b. Arm/Leg Finish: Hot Dip galvanized powder coated steel.
 - c. Arm/Leg color: RAL Classic 3001 (signal red)
 - d. Back/Seat Finish: Wood; Nordic Pine
2. Bench Type B - Large Stripes Circle bench model no. 3610 as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Surface Mounted
 - b. Base Finish: Hot Dip galvanized powder coated steel.
 - c. Base color: RAL Classic 3001 (signal red)
 - d. Seat Finish: Wood; Nordic Pine
3. Lounge Chair - Bloc Sun Bench model no. 1566 as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Surface Mounted
 - b. Base Finish: Hot Dip galvanized powder coated steel.
 - c. Base color: RAL Classic 3001 (signal red)
 - d. Seat Finish: Wood; Nordic Pine
4. Picnic Table – Berg Picnic Table model 322 as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Surface Mounted
 - b. Leg Finish: Hot Dip galvanized powder coated steel.
 - c. Leg color: RAL 3001 (signal red)
 - d. Table: Wood; Nordic Pine
5. Picnic Table-ADA – Berg Picnic Table model 322 as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Surface Mounted
 - b. Leg Finish: Hot Dip galvanized powder coated steel.
 - c. Leg color: RAL Classic 3001 (signal red)
 - d. Table: Wood; Nordic Pine
6. Waste Receptacle – Poe Litter as manufactured by Landscape Forms, Kalamazoo, MI. Phone: 800-521-3455 or approved equal.
 - a. Size: 29"x44"x 34 gal.
 - b. Opening: Side
 - c. Mounting: Surface Mounted
 - d. Finish: Cast and extruded Aluminum with Cast Iron base
 - e. Bin Color: Cranberry
 - f. Slip Liner: Black polyethylene
 - g. Include Lock
7. Pet Waste Station – Pet Waste Station model 395 SM with hand sanitizer as manufactured by Most Dependable Fountains, Inc. Arlington, TN phone: 901-867-0039 or approved equal.
 - a. Mounting: Direct bury installation
 - b. Body: One-piece Welded construction standard 3/16" wall.
 - c. Color: Textured Burgundy
 - d. Bag Dispenser: Stainless Steel with tamper proof locking lid
 - e. Trash receptacle: 10-gallon unit

8. Drinking Fountain– Bottle Fillers model no. 10145 SMSS as manufactured by Most Dependable Fountains, Inc. Arlington, TN phone: 901-867-0039 or approved equal.
 - a. Mounting: As per manufacturer's directions
 - b. Body: One-piece Welded construction standard 3/16" wall.
 - c. Color: Textured Burgundy
9. Pet Fountain – Outdoor pet drinking fountain model 440 SMSSFA with pet fountain as manufactured by Most Dependable Fountains, Inc. Arlington, TN phone: 901-867-0039 or approved equal.
 - a. Mounting: As per manufacturer's directions
 - b. Body: One-piece Welded construction standard 3/16" wall.
 - c. Color: Textured Burgundy
10. Bicycle Rack - Folk Bicycle Post Large model 4986A as manufactured by Vestre, 175 Varick Street New York, NY. Phone: +1 212-634-9658 or approved equal.
 - a. Mounting: Anchoring with base plate to concrete foundation.
 - b. Finish: Powder coated Aluminum
 - c. Color: RAL Classic 3001 (signal red)
11. Hot Coal Bin – Hot coal bin with collection can Model HCB/B-1 with Model CNG-2310C as manufactured by Pilot Rock, Cherokee, IA phone: 800-762-5002 or approved equal.
 - a. Mounting: Surface mount model no. BR-4HSA
 - b. Finish: High heat enamel coated galvanized steel can
 - c. Color: Black
 - d. Collection can: 31 gal. galvanized steel
 - e. Include lockable tension latch
12. BBQ Grill – Model BBQ 2SM as manufactured by Most Dependable Fountains, Inc. Arlington, TN phone: 901-867-0039 or approved equal.
 - a. Mounting: As per manufacturer's directions
 - b. Finish: Hot dip galvanized powder coated Steel
 - c. Color: Black
 - d. Grate: Stainless Steel mid-hinged
13. Welcome Sign –Custom stainless-steel panel with perforated graphic design and lettering, mounted on a steel frame. Provide RIOC's Representative-stamped shop drawings. Mock ups of perforation samples required.
 - a. Sign Panel: shop drawing approval required prior to mockup fabrication
 1. 316 Stainless Steel, 16-gauge panel, non-directional No. 4 finish
 2. Lettering and Image Pattern: Digital Image files shall be provided by Landscape architect upon request for RIOC approved graphic, text and font.
 3. Perforated hole size ranging from 1/8" to 1/2"
 - b. Frame: 3.5" Square Hollow Structural Steel
 - c. Base: reinforced concrete
14. Dog Agility Equipment – shall be as manufactured by Gyms for Dogs, 3815 River Crossing Pkwy #100, Indianapolis, IN. phone: 800-931-1562 or approved equal.
 - a. Balance beam shall be 'Ellie's Jump Balance Beam Large" model DL-LBB2-GRC as per recommended manufacturer, or approved equal

- b. Bridge Climb 1 shall be 'Bridge Climb (S/M)' model DL-BC1-RPW as per recommended manufacturer, or approved equal
 - 1. Color: Nutmeg
- c. Bridge Climb 2 shall be 'Bridge Climb (L/X)' model DL-BC2-RPW as per recommended manufacturer, or approved equal
 - 1. Color: Nutmeg
- d. Play Bone 1 shall be 'Ellie Bear's Play Agility Bone Luxury (S/M)' model DL-EBPB-CRT as per recommended manufacturer, or approved equal
 - 1. Color: Polar Ice White-Antique
- e. Play Bone 2 shall be 'Ellie Bear's Play Agility Bone Luxury (L/X)' model DL-EBPB2-CRT as per recommended manufacturer, or approved equal
 - 1. Color: Polar Ice White-Antique
- f. Hill Climb model DL-HC-RPW as per recommended manufacturer, or approved equal
 - 1. Color: Nutmeg
- g. Climbing Boulder 1 shall be 'Natural Climbing Boulder – Economy Lightweight Medium' model DL-NCBMED-ECO as per recommended manufacturer, or approved equal
- h. Climbing Boulder 2 shall be 'Natural Climbing Boulder – Economy Lightweight small' model DL-NCBSM-ECO as per recommended manufacturer, or approved equal

2.02 WELCOME SIGN MATERIALS

- A. Anchors, Fasteners, Fittings, and Hardware: Stainless steel grade #304, #316 or Manufacturer's standard, corrosion-resistant-coated or non-corrodible materials; commercial quality; tamperproof, vandal and theft resistant; concealed, recessed, and capped or plugged. Provide as required for site and street furnishings' assembly, mounting, and secure attachment.
- B. Comply with the following standards for the forms and types of stainless steel for the required items of work.
 - 1. Pipe: ASTM A 312, Grade TP 316
 - 2. Sheet, Strip, Flat Bar and Plate: ASTM A 666, Type 316.
 - 3. Tubing: ASTM A 554, Grade MT 316.
 - 4. Bars and Shapes: ASTM A 276, Type 316.
- C. Fasteners: Furnish basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Provide Phillips flat-head screws for exposed fasteners, unless otherwise indicated. Once installed, secure fasteners with construction adhesive by Loctite or approved equal.

2.03 WELCOME SIGN FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: 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 and railing components.
- D. Steel and Iron Components: Galvanized, galvanized and color coated, or color coated. Bare metal steel or iron components are not permitted.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; smooth all surfaces, free from burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.
- G. Perforated Holes: Drill or cleanly punch holes (do not burn), so that holes will be accurate, clean, neat and precise without deforming adjacent surfaces or metals.
- H. Cutting: Cut metal by sawing, shearing or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, precise, square and free of burrs, without deforming adjacent surfaces or metals.

2.04 WELCOME SIGN FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with site furnishings installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

3.02 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, other facilities, lawns and existing exterior plants from damage caused by site furnishing placement.
- B. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before placing furnishings. Make minor adjustments as required.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of site furnishings, where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

3.04 CLEANING

- A. After completing site and street furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceways and cables.
 - 2. Sleeve seals.
 - 3. Grout.
 - 4. Common electrical installation requirements.

1.02 SUBMITTALS

- A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.02 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

2.03 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

- J. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- K. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.03 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1. - GENERAL

1.01 SUMMARY

- A. Section includes distribution wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.02 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 14 AWG for control circuits.
 - 5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Service Entrance: Use only Type RHW-2/USE-2 insulation in raceway.
 - 2. Feeder and Branch Circuits (Exterior Locations): Use only Type XHHW-2 insulation in raceway.
 - 3. Feeder and Branch Circuits (Interior Locations): Use only Type THHN/THWN-2 insulation in raceway.

1.04 SUBMITTALS

- A. Product Data: Submit for each cable type.
- B. Test Reports: Indicate procedures and values obtained.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and circuits.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with New York State and New York City standards.
- B. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.09 COORDINATION

- A. Where wire and cable destination are indicated and routing is not shown, determine routing and lengths required.
- B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2. - PRODUCTS

2.01 SERVICE ENTRANCE CABLE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Insulation Temperature Rating: 90 degrees C.
- D. Insulation: Type RHW-2/USE-2.

2.02 EXTERIOR CABLE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Insulation Temperature Rating: 90 degrees C.
- D. Insulation: Type XHHW-2.

2.03 INTERIOR CABLE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Insulation Temperature Rating: 90 degrees C.
- D. Insulation: Type THHN/THWN-2.

2.04 TERMINATIONS

- A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

- B. Lugs for Wires 4 AWG and Larger: Color keyed compression type copper, with insulating sealing collars.

PART 3. - EXECUTION

3.01 EXAMINATION

- A. Verify interior of building has been protected from weather.
- B. Verify mechanical work likely to damage wire and cable has been completed.
- C. Verify raceway installation is complete and supported.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03 EXISTING WORK

- A. Remove exposed abandoned wire and cable. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Extend existing circuits using materials and methods as specified.
- E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.04 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques - Cable in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install distribution wire 4 AWG and larger with pulling equipment.
 - 3. Use suitable direct burial cable fittings and connectors.
- E. Special Techniques - Wiring Connections:
 - 1. Clean conductor surfaces before installing lugs and connectors.
 - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.

4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- F. Install solid conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
- G. Install terminal lugs on ends of 600-volt wires unless lugs are furnished on connected device, such as circuit breakers.
- H. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
- I. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.05 WIRE COLOR

- A. General:
 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices, and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 1. For 6 AWG and smaller: Green.
 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.06 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1. - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Rod electrodes.
 - 2. Active electrodes.
 - 3. Wire.
 - 4. Grounding well components.
 - 5. Mechanical connectors.

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Metal underground water pipe.
 - 2. Metal building frame.
 - 3. Rod electrode.

1.04 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 25 ohms maximum.

1.05 SUBMITTALS

- A. Product Data: Submit data on grounding electrodes and connections.
- B. Test Reports: Indicate overall resistance to ground.
- C. Manufacturer's Installation Instructions: Submit for active electrodes.

1.06 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.07 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Perform Work in accordance with New York State and New York City standards.
- C. Maintain one copy of each document on site.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years experience.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2. - PRODUCTS

2.01 ROD ELECTRODES

- A. Product Description:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.
- B. Connector: Connector for exothermic welded connection.

2.02 WIRE

- A. Material: Stranded copper.
- B. Electrodes: Size as note on plans.
- C. Grounding Electrode Conductor: Copper conductor insulated.
- D. Bonding Conductor: Copper conductor insulated.

PART 3. - EXECUTION

3.01 EXAMINATION

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.02 PREPARATION

- A. Remove paint, rust, mill oils and surface contaminants at connection points.

3.03 EXISTING WORK

- A. Modify existing grounding system to maintain continuity to accommodate renovations.
- B. Extend existing grounding system using materials and methods as specified.

3.04 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install grounding and bonding conductors concealed from view.
- D. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- E. Install continuous grounding using underground cold-water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
- F. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground metal conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

3.05 FIELD QUALITY CONTROL

- A. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- B. Perform ground resistance testing in accordance with IEEE 142.
- C. Perform continuity testing in accordance with IEEE 142.
- D. When improper grounding is found on new installations, check new installations in entire project and correct. Perform retest.

END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Conduit
2. Handholes and boxes.
3. Manholes.

1.02 SUBMITTALS

A. Product Data: For accessories for manholes, handholes, and boxes.

B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:

1. Reinforcement details.
2. Frame and cover design and manhole frame support rings.
3. Grounding details.
4. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
5. Joint details.

C. Shop Drawings for Factory-Fabricated Handholes and Boxes: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:

1. Cover design.
2. Grounding details.
3. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

D. Field quality-control test reports.

1.03 QUALITY ASSURANCE

A. Comply with ANSI C2.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.

- B. HDPE Conduit: Comply with ASTM D-3350.
- C. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.02 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ARNCO Corp.
 - 2. Beck Manufacturing.
 - 3. Cantex, Inc.
 - 4. CertainTeed Corp.; Pipe & Plastics Group.
 - 5. Condux International, Inc.
 - 6. ElecSys, Inc.
 - 7. Electri-Flex Company.
 - 8. IPEX Inc.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT; a division of Cable Design Technologies.
 - 11. Spiraduct/AFC Cable Systems, Inc.
- C. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
- D. Duct Accessories:
 - 1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
 - 2. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification for Electrical Systems."

2.03 HANDHOLES AND BOXES

- A. Description: Comply with SCTE 77.
 - 1. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
 - 2. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 3. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 4. Cover Legend: Molded lettering, As indicated for each service.
 - 5. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - 6. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

- B. Fiberglass Handholes and Boxes with Polymer Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. Christy Concrete Products.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
 - e. Quazite
- C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with covers of fiberglass.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carson Industries LLC.
 - b. Christy Concrete Products.
 - c. Nordic Fiberglass, Inc.

2.04 PRECAST MANHOLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carder Concrete Products.
 - 2. Christy Concrete Products.
 - 3. Elmhurst-Chicago Stone Co.
 - 4. Oldcastle Precast Group.
 - 5. Riverton Concrete Products; a division of Cretex Companies, Inc.
 - 6. Utility Concrete Products, LLC.
 - 7. Utility Vault Co.
 - 8. Wausau Tile, Inc.
- C. Comply with ASTM C 858 and with interlocking mating sections, complete with accessories, hardware, and features.

1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
 - a. Windows shall be located no less than 6 inches from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
 - b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in-to concrete envelopes of duct banks.
 - c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
- D. Concrete Knockout Panels: 1-1/2 to 2 inches thick, for future conduit entrance and sleeve for ground rod.
- E. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.05 UTILITY STRUCTURE ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Bilco Company (The).
 2. Campbell Foundry Company.
 3. Carder Concrete Products.
 4. Christy Concrete Products.
 5. East Jordan Iron Works, Inc.
 6. Elmhurst-Chicago Stone Co.
 7. McKinley Iron Works, Inc.
 8. Neenah Foundry Company.
 9. NewBasis.
 10. Oldcastle Precast Group.
 11. Osburn Associates, Inc.
 12. Pennsylvania Insert Corporation.
 13. Riverton Concrete Products; a division of Cretex Companies, Inc.
 14. Strongwell Corporation; Lenoir City Division.
 15. Underground Devices, Inc.
 16. Utility Concrete Products, LLC.
 17. Utility Vault Co.
 18. Wausau Tile, Inc.
- C. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.
 1. Frame and Cover: Weatherproof, gray cast iron complying with ASTM A 48/A 48M, Class 30B with milled cover-to-frame bearing surfaces; diameter, 29 inches.
 - a. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

- b. Special Covers: Recess in face of cover designed to accept finish material in paved areas.
- 2. Cover Legend: Cast in. Selected to suit system.
 - a. Legend: "ELECTRIC " for duct systems with power wires and cables for systems operating at 600 V and less.
 - b. Legend: "COMMUNICATION" for communications, data, and telephone duct systems.
- 3. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.
 - a. Mortar for Chimney Ring and Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.
- D. Manhole Sump: Depression cast in floor.
- E. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch-diameter eye, and 1-by-4-inch bolt.
 - 1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
- F. Pulling Eyes in Nonconcrete Walls: Eyebolt with reinforced fastening, 1-1/4-inch-diameter eye, rated 2500-lbf minimum tension.
- G. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch- diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
 - 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
- H. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.
 - 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- I. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
- J. Cable Rack Assembly: Steel, hot dip galvanized, except insulators.
 - 1. Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
 - 2. Arms: 1-1/2 inches wide, lengths ranging from 3 inches with 450-lb minimum capacity to 18 inches with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
 - 3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.

- K. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- L. Cover Hooks: Light duty, designed for lifts less than 60 lbf Two required.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.
- D. Cut and patch existing pavement in the path of underground ducts and utility structures.

3.02 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations, unless otherwise indicated.
- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inch ducts, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.
 - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for

duct-to-conduit transition. Install conduit penetrations of building walls as specified in Division 26 Section "Common Work Results for Electrical."

- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf- test nylon cord in ducts, including spares.

3.03 INSTALLATION OF CONCRETE MANHOLES

- A. Comply with ASTM C 891, unless otherwise indicated.
- B. Install units' level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
- C. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- D. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
- E. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
- F. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
- G. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.
- H. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
- I. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
- J. Field-Installed Bolting Anchors: Do not drill deeper than 3-7/8 inches for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.
- K. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.

3.04 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch above finished grade.
- D. Install handholes and boxes with bottom below the frost line, below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 GROUNDING

- A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.06 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 - 3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.07 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION

SECTION 26 05 23
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1. - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Labels.
 - 3. Wire markers.
 - 4. Underground Warning Tape.
 - 5. Lockout Devices.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog literature for each product required.
 - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.
- B. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.03 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance New York State and New York City standards.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept identification products on site in original containers. Inspect for damage.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Install labels only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

1.08 EXTRA MATERIALS

- A. Requirements for extra materials: as noted on the plans in the specifications.

PART 2. - PRODUCTS

2.01 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved black letters on white background color.
- B. Letter Size:
 - 1. 1/4-inch-high letters for identifying grouped equipment and loads.
- C. Minimum nameplate thickness: 1/8 inch

2.02 LABELS

- A. Labels: Embossed adhesive tape, with 3/16-inch white letters on black background.

2.03 WIRE MARKERS

- A. Description: Cloth tape type wire markers.
- B. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.

2.04 UNDERGROUND WARNING TAPE

- A. Description: 4-inch-wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3. - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 EXISTING WORK

- A. Install identification on existing equipment to remain in accordance with this section.
- B. Replace lost nameplates and labels.

3.03 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.

3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
 4. Secure nameplate to equipment front using adhesive.
 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
 6. Install nameplates for the following:
 - a. Switchboards.
 - b. Panelboards.
 - c. Transformers.
 - d. Disconnect Switches.
- C. Label Installation:
1. Install label parallel to equipment lines.
 2. Install label for identification of individual control device stations.
 3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
1. Install wire marker for each conductor at panelboard gutters; pull boxes, outlet, and junction boxes.
 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
 3. Install labels at data outlets identifying patch panel and port designation.
- E. Underground Warning Tape Installation:
1. Install underground warning tape along length of each underground conduit, raceway, or cable 12 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 31 11 23
WELL-GRADED AGGREGATE BASE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1-General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Graded stone base shall consist of the furnishing and placing of broken stone in the place designated on the plans, and in such other locations as field conditions require. The thicknesses and locations of the "graded stone base" shall be as shown on the plans or as determined by field conditions and ordered by the Engineer.

1.03 RELATED SECTIONS

Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 32 19 – Geotextile for Drainage

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials for this work shall be of sound, clean, hard, durable freshly broken unweathered stone not contaminated with clay and free from any organic or other deleterious material. Prior to the placement of any base material, the Contractor shall submit a representative sample to the Engineer and obtain approval, in writing. The material shall meet the following gradation requirements
40 mm i
 - 1) Well-Graded Compacted Aggregate – NYSDOT Item 4
- B. The quality of the stone particles shall be determined by the Magnesium Sulphate Soundness Test. The maximum percent loss at 4 cycles, by weight, shall be 20.
- C. Should, at any time during work and for any reason, the material fail to conform to the specified quality and gradation requirements, the Contractor shall by the addition of selected acceptable material, and/or satisfactory manipulation, produce a material meeting the above requirements.

PART 3 - EXECUTION

3.01 METHOD

- A. The material shall be spread in equal thickness layers. The spreading of any layer of this material shall be done with spreader equipment approved by the Engineer and shall be spread to such thickness that the minimum depth of the layer, after compaction, will be 6 inches. Spreading from piles dumped on the roadway will not be permitted. No segregation of large or fine particles will be allowed, but the material, as spread, shall be well graded, with no pockets of fine material. Water shall be added in such amounts, as the Engineer may consider necessary to obtain satisfactory compaction.

- B. When the moisture content of the layer is within the limits for proper compaction, the entire surface shall be rolled with a pneumatic tire roller, having an operating weight of between 1,000 and 2,500 pounds per tire, or smooth steel wheel roller, having a minimum weight of ten (10) tons. Each portion of the layer shall be covered by a minimum of eight (8) passes of the roller.

For heavier vibratory or more efficient types of approved compaction equipment, the minimum number of passes required on all portions of each layer shall be determined by the Engineer after appropriate field tests to evaluate the efficiency of such equipment. In limited areas, where the use of a roller is impractical, approved vibrating plate compactors or impact rammers shall be used to compact the material.

- C. After compaction, the top surface of this base shall not extend above, nor more than ½ inch below, true grade and surface at any location. The base, at any location, shall be compacted, finished and completed to the above tolerance and approved by the Engineer, before any succeeding pavement course is placed at the location. Any depressions or holes shall be filled with approved coarse sand or screenings and the surface re-rolled.

In all cases, this stone base must be so thoroughly compacted that it will not weave under the roller.

- D. The width of the layer of this base shall be restricted to that required for placement of the lane being paved and shall not be laid in excess of 500 linear feet without being compacted. No traffic or hauling other than that necessary for bringing material for the next course, shall be permitted over this base. Should the subgrade, subbase, or any other material become churned up into or mixed with this base, for any reason whatsoever, the Contractor shall, at his own expense, remove such mixtures and replace with open-graded stone acceptable for this Section.

The Contractor shall assume full responsibility for any contamination and/or degradation of any part of this base during construction and shall, at his own expense, remove any and all portions of this base which do not conform to the requirements of these specifications and replace these portions with specified material.

- E. When the fill layers specified will be installed over a geosynthetic product such as a geotextile or a geogrid, the installer must comply with the applicable requirements of the published installation guidelines of the geosynthetic product manufacturer.

END OF SECTION

SECTION 31 12 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Clear and grub the project area in accordance with specifications.
- B. Clear and grub includes removal of trees and stumps with 6" caliper or less.

1.03 RELATED SECTIONS

Section 01 56 39 - Care and Protection of Trees
Section 02 02 22 - Demolition and Removals
Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 22 00 - Grading, Filling and Compaction
Section 31 23 33 - Excavating, Backfilling and Compaction for Pipes and Utility Trenches

1.04 SPECIAL REQUIREMENTS FOR LONGHORNED BEETLE QUANTINE ZONE

- A. For tree work to be performed within the quarantine zone, the Contractor shall utilize the service of a Sub / Contractor certified by the New York State Department of Agriculture and Markets. Due to current Federal, State and NYC policy, any wood waste that is generated must be completely chipped within the Quarantine Zone, by said certified Sub/Contractor.

1.05 SUBMITTALS

- A. Qualification Data: For Quarantine Zone, State Certification- For Contracts within the Quarantine Zone, the Sub / Contractor must submit a copy of a valid Compliance Agreement issued by the State of New York Department of Agriculture and Markets, Division of Plant Industry.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

- A. Unless otherwise directed, the Contractor shall thoroughly clear, grub and remove all objectionable surface material.
- B. When directed, objectionable subsurface material, as heretofore described, shall be removed to a depth of six (6) inches.
- C. No trees or shrubs shall be removed except as ordered by the Engineer.
- D. All cleared and grubbed material and all other debris shall be removed from the site of the contract or disposed of as directed by the Engineer. In quarantine zone, material must be chipped, as noted above.

3.02 SPECIAL REQUIREMENTS FOR CLEARING AND GRUBBING UNDER EXISTING TREES

- A. Clearing and Grubbing within the limits of the drip line of existing trees shall be performed by hand methods only. Tree protection fences shall not be moved or removed without the written permission of RIOC's representative.

END OF SECTION

SECTION 31 13 10 PREPARATORY TREE PRUNING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under these Items, the Contractor shall perform Preparatory Pruning of trees over 6" to 12" DBH, in accordance with the plans, and specifications.

Note: DBH is defined as Diameter at Breast Height, which is 4'-6" above mean grade.

1.03 RELATED SECTIONS

Section 01 56 39 - Care and Protection of Trees
Section 01 40 10 - Consultant Arborist

1.04 SUBMITTALS

- A. The Contractor shall submit for approval, the name and qualifications of the proposed tree care sub/Contractor prior to performing work. The Contractor shall submit the following:
1. Qualification Data: Proof of three (3) years of non-utility pruning experience or I.S.A. certification with documented non-utility pruning experience.
 2. Certification: Documentation of eight (8) hours of required education or I.S.A. certification.
 3. References: Name, address, and phone numbers for three (3) professional references associated with non- utility pruning work performed within the past three (3) years.
 4. Certification: State Certification-The Contractor must submit a copy of a valid Compliance Agreement issued by the State of New York Department of Agriculture and Markets, Division of Plant Industry. The arborist shall meet the qualifications listed on the first page of this item under the heading Qualifications Required. Verification of certification, qualifications, and references must be submitted to RIOC's Representative for approval prior to performing any work.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 NOTIFICATION

- A. Before any pruning work can begin under this item, the Consultant Arborist (CA) must be notified a minimum of 48 hours prior to beginning work.
- B. All of the following information and instructions are subject to the approval and direction of RIOC's Representative and the Consultant Arborist.

3.02 QUALIFICATIONS REQUIRED

- A. Asian Longhorned Beetle Quarantine Zone Regulations: Due to current Federal, State and NYC DPR policy, any wood waste that is generated must be completely chipped by a Sub/Contractor certified by the New York State Department of Agriculture and Markets to perform tree work within the Quarantine Zone.

3.03 PRUNING METHOD

- A. Tree Pruning (Preparatory): No trees shall be pruned except as directed by RIOC of The Arboriculture and Horticulture Unit or his designated representative. Before pruning an arborist or arborist trainee shall visually inspect each tree before beginning work. If a condition requiring attention beyond the original scope of the work is observed, the condition shall be reported to RIOC of The Arboriculture and Horticulture Unit or his designated representative.
- B. All work shall be performed by skilled persons directly employed and supervised by the Sub/ Contractor. The current prevailing wage rates and supplemental benefits, as established by the Office of the Comptroller of the City of New York, shall be paid to all assigned personnel. The Contractor may exceed these rates, but they may not pay a lower rate.
- C. The Contractor or their authorized representative must be present at the work site at all times while work is being performed to receive and promptly execute all orders and/or directions of RIOC of Arboriculture and Horticulture Unit or his designated representative. The aforementioned provision shall be obeyed irrespective of whether the work is being performed by the Contractor or a Subcontractor.
- D. Equipment, tools, and work practices that damage living tissue and bark beyond the scope of normal work shall be avoided. Pruning tools shall be sharp to avoid unnecessarily damaging tissue. Climbing spurs shall not be used when entering and climbing trees for the purpose of pruning, except when branches are more than throw-line distance apart and there is no other means of climbing.
- E. Pruning of the crown shall be performed in such a manner as to maintain the shape of the particular species and the balance and symmetry of the tree in general while retaining as much fine growth as possible. Live branches or limbs 4-inches in diameter and larger shall not be removed without the written permission of RIOC of The Arboriculture and Horticulture Unit or his designated representative. On trees known to be diseased or where there is known danger of transmitting disease, tools are to be disinfected with wood alcohol after each cut and after completion of each tree.
- F. All work shall be performed in a professional manner and in accordance with the most current revision of the American National Standards for Tree Care Operations: Tree, Shrub, and Other Woody Plant Maintenance and Standard Practices, A-300-(Part 1)- 2008 Pruning, published by the American National Standards Institute (ANSI). ANSI Standards are made part of this contract by this reference.
- G. A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent branch without cutting into the branch bark ridge or branch collar or leaving a stub. A pruning cut that reduces the length of a branch or parent stem shall be made at a slight downward angle relative to the remaining stem and not damage the remaining stem. Smaller cuts shall be preferred. When pruning to a lateral, the remaining lateral branch shall be large enough to assume the terminal role. A cut that removes a branch with a narrow angle of attachment shall be made from the outside of the

branch to prevent damage to the parent branch. The final cut shall result in a flat surface with adjacent bark firmly attached. When removing a dead branch, the final cut shall be made just outside the collar of living tissue. Wound treatment shall not be used to cover wounds or pruning cuts, except when necessary for disease, insect, mistletoe, or sprout control, or for cosmetic reasons. Wound treatments that are damaging to tree tissue shall not be used. When tracing wounds, only loose, damaged tissue shall be removed.

- H. Pruning shall be performed in such a manner so as to avoid damage to other parts of the tree or other vegetation within proximity of the tree being pruned. Branches too large to support with one hand shall be pre-cut to avoid splitting of the wood or tearing of the bark. Where necessary, ropes or other equipment shall be used to lower large branches or portions of branches to the ground. The Contractor shall carefully protect from damage all existing vegetation, site features, and all other property which is to remain. The Contractor shall be liable for any and all damage to the above resulting from tree pruning operations and shall be responsible for the replacement or restoration of same where damaged, at the direction of and to the satisfaction of RIOC's Representative.
- I. Pruning shall occur for, but not be limited to, the following situations: interference with new fences, lights or utilities, to achieve the required clearance for pedestrian or vehicular passage.
- J. Pruning objectives shall be defined as, but are not limited to; Structural, Restoration, Cleaning, Raising, Reducing, and Thinning. Defined as the following and as directed by the Consultant Arborist.

3.04 STRUCTURAL PRUNING

- A. Shall consist of selective pruning to improve tree and branch architecture primarily on young-and medium-aged trees by selecting a dominant leader and removing or reducing competing leaders, removing intertwining branches, interfering, overextended, defective, weak, and poorly attached branches shall be removed or reduced.

3.05 RESTORATION PRUNING

- A. Shall consist of selective pruning to redevelop structure, form, and appearance of severely pruned, vandalized, or damaged trees.

3.06 CLEANING

- A. Shall consist of pruning to remove branches that are dead, diseased, insect infested, and/or broken 1.5-inches in diameter and larger throughout the entire tree canopy, as well as vines and other invasive vegetation.

3.07 RAISING

- A. Shall consist of pruning to provide vertical clearance. All branches shall be removed to a height sufficient to permit free passage of both pedestrian and vehicular traffic, approximately eight foot (8') clearance for paths and fourteen feet (14') for roadways, as directed by RIOC of The Arboriculture and Horticulture Unit. In lifting the bottom branches of trees for under clearance, care shall be given to maintain symmetrical appearance.

3.08 REDUCING

- A. Shall consist of pruning to decrease the canopy height and/or spread as directed by the Consultant Arborists.

3.09 THINNING

- A. Shall consist of selective pruning to reduce the density of live branches in an attempt to permit establishment of grass, ground cover, and other plant material, or for aesthetic considerations.
- B. AT NO TIME SHALL MORE THAN 20% OF A TREE'S LIVE CANOPY BE REMOVED.
- C. Debris: If directed by RIOC's Representative, pruned material shall be chipped and spread as mulch to supplement "Protect existing tree roots with wood chips" item. All other pruned material and debris shall be removed from the site of the contract within twenty four (24) hours and disposed of as directed by the Engineer, and as per the Quarantine provisions.

END OF SECTION

SECTION 31 13 11 DECOMPACT TREE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. The Contractor/Subcontractor's arborist shall Decompact Trees over 6" to 12" DBH, in accordance with the plans, specifications, as directed by RIOC's Representative, and Consultant Arborist.

Note: DBH is defined as Diameter at Breast Height, which is 4'-6" above mean grade.

NOTIFICATION: Before any decompaction work can begin under this item, RIOC's Representative and Consultant Arborist must be notified a minimum of 48 hours prior to beginning work.

1.03 RELATED SECTIONS

Section 01 56 39- Care and Protection of Trees
Section 01 40 10 - Consultant Arborist

1.04 QUALITY ASSURANCE

- A. All work shall be performed under the supervision of a qualified arborist. Certification by the International Society of Arboriculture (I.S.A.), Champaign, IL shall be considered proof of the requisite experience and educational requirements. Also, see requirements listed under heading "Submittals". For additional information regarding procedures, contact RIOC's Representative.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Compost: shall contain organic matter, or material of generally humus nature capable of sustaining the growth of vegetation, with no admixture of refuse or material toxic to plant growth. The Compost shall be free of pathogens and stones, lumps, or similar objects larger than two inches (2") in greatest diameter, as well as roots, brush, and weeds.
- B. Composts that have been derived from organic wastes such as food and agriculture residues, animal manures, and sewage sludge that meet the above requirements, and are approved by the New York State DEC, are acceptable compost sources. Compost shall have an approximate N-P- K analysis of at least 1-1-0 as delivered, with a pH between 5.5 and 8.0 and a solids content of at least fifty percent (50%). Compost shall have a minimum of twenty five (25%) to a maximum of fifty percent (50%) organic material.
- C. Compost shall be from Long Island Compost, Islip, NY or "Nature's Choice

Compost" by Nature's Choice Corp., Union, NJ, or Agresoil compost by Agresource, Inc. Amesbury, MA or approved equal.

- D. Organic biosolids are not acceptable. Compost available from NYC Department of Sanitation may be acceptable for purposes of this specification. See www.nyc.gov/sanitation or www.nyccompost.org for pick-up sites.

PART 3 - EXECUTION

3.01 METHOD

- A. Where specified, existing trees to remain shall be decompacted after completion of construction operations including excavation, paving, pruning, and backfilling. Decompaction shall be performed utilizing one of the three methods listed below as shown on the contract tree protection plan or as determined by the Arboriculture and Horticulture Unit. All tree root protection shall be removed prior to starting decompaction and decompaction shall not be performed in frozen ground conditions.
1. Air-Tilling of the Critical Root Zone Method: Using a pneumatic device, The area within a 3 to 5 foot radius of the tree stem, and specified on the Tree Protection Plan, is to be tilled to a depth of 6 to 8-inches using a compressed air gun. Compost backfill shall be applied to the area at a depth of 1-inch and tilled into the soil using a compressed air gun. The area shall be top dressed with four-inches (4") of shredded bark mulch and thoroughly watered (paid under a separate item).
 2. Radial Trenching Method: Using a pneumatic device, narrow trenches, 18 to 24-inches wide, shall be cut in a radial pattern throughout the root zone. These trenches appear similar to the spokes of a wagon wheel. The trenches shall begin two (2') feet from the trunk of the tree and between buttress roots to avoid cutting any major support roots. The trenches should extend at least as far as the dripline of the tree. The trenches shall be 8-12 inches in depth. Compost backfill shall be used to fill the trenches. Where required, fertilizer may be mixed with the compost and applied. The area shall be thoroughly watered after completion.
 3. Vertical Mulching Method: Three inch (3") diameter holes shall be excavated 12" deep, spaced 30" on center in a grid pattern throughout the root zone of the tree. Compost backfill shall be used to fill the holes and the area shall be thoroughly watered after completion.

<u>Tree DBH</u>	<u>Number of 3" Dia. Holes</u>
0-6"	40
6-12"	60
12-18"	80
18-24"	100
24-30"	120
30-36"	160
36-42"	180
42-48"	200
over 48"	220

- B. Where a pneumatic device is required, work shall be performed with a device such as an Air- Spade® CGP System, as manufactured by Concept Engineering Group, Inc. Verona, PA, or approved equal. The Contractor shall provide a compressor unit for operating the pneumatic excavator rated at one hundred fifty standard cubic feet per minute (150 scfm) at ninety pounds per square foot gauge (90 psfg). Different nozzles may be used on the air spade to expedite the work or minimize the amount of airborne material. Where a pneumatic device is used, care shall be taken to avoid rocks being scattered and inadvertently damaging private or public property. In addition, operators must be equipped with adequate protective clothing and gear, in accordance with manufacturer's recommendations. All tree roots exposed by the pneumatic or hand excavation operation must be kept constantly moist with burlap covered with white plastic and checked a minimum of two (2) times a day, once in the morning and once in the afternoon, for a maximum of forty-eight (48) hours, until backfill is complete as directed by RIOC's Representative.
- C. Watering: Watering shall take place at one-week intervals for a period of three weeks following decompaction at a rate of 750 gallons of water per 1000 square feet of decompacted area. The Engineer may order less watering based on weather conditions, resulting soil water content or other factors. If drought conditions warrant, the Project Engineer may order more frequent watering than scheduled or during non-scheduled periods. A watering schedule shall be submitted to the Engineer each week.
- D. Watering for trees shall be conducted by dispersing water to plants individually. Water shall be delivered to each plant under low pressure through the end of an appropriate sized hose or watering wand, or soaker hose anchored by pins where appropriate. The rate of watering should allow maximum penetration of water into the soil and at a rate that does not displace mulch or soil, cause uprooting or exposure of plant root to the air or break saucers around plants that were created to hold water.
- E. Water shall not be applied in a manner which damages plants, stakes or adjacent areas. Watering shall not cause uprooting or exposure of plant's roots to the air. Damages resulting from these operations shall be immediately repaired at the Contractor's expense.
- F. Where water is supplied from City hydrants, the Contractor shall obtain a free hydrant permit from the Department of Environmental Protection. Permits are issued for a 30-day period, and the Contractor is responsible for keeping the permits current. The permits are available from each borough office. The Telephone numbers of borough offices are:

Manhattan: 212-643-2205
Brooklyn: 718-852-5088 or 5046
Bronx: 718-579-6975 or 6985
Queens: 718-595-4593 or 4592
Staten Island: 718-876-6808 or 6807

END OF SECTION

**SECTION 31 13 12
PREPARATORY FERTILIZE EXISTING TREE**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under this Item, the Contractor shall fertilize existing trees in accordance with the plans, specifications, and as directed by the Capital Projects Arborist.

Note: DBH is defined as Diameter at Breast Height, which is 4'-6" above mean grade.

NOTIFICATION: Before any work can begin under this item, RIOC's Representative and Consultant Arborist must be notified a minimum of 48 hours prior to beginning work.

1.03 RELATED SECTIONS

Section 01 56 39 - Care and Protection of Trees
Section 01 40 10 - Consultant Arborist

1.04 SUBMITTALS

- A. Method of Procedure: Arborist shall submit proposed materials and methods for each individual tree scheduled to be fertilized under this item for approval by RIOC's Representative. For material substitutions, a written request must be submitted to Director's Representative, copy to the Landscape Act. Contractor shall submit this request, along with manufacturer's data sheets for approval, a minimum of two weeks prior to the intended date of application. All substitutes must be approved in writing.

1.05 QUALITY ASSURANCE

- A. Certification by the International Society of Arboriculture (I.S.A.), Champaign, IL shall be considered proof of the requisite experience and educational requirements. See qualification requirements listed in this specification under the heading "Submittals".

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Fertilizer: shall be dry, water-soluble micronutrient treatment that includes beneficial rhizosphere bacteria such as, BioPak Plus, as manufactured by Plant Health Care, Inc., Pittsburgh, PA, or approved equal, and shall have the following composition by weight: Nitrogen-three (3%), percent, Phosphate-zero (0%) percent, Potassium-twenty (20%) percent, Magnesium-one and one-half (1.5%) percent, Sulfur – four (4%) percent, Boron-two one-hundredth (0.02%) percent, Iron – seven (7%) percent, Manganese – two tenths (0.2%) percent, and Zinc – two tenths (0.2%) percent.

- B. Mycorrhizal Fungi Inoculant: shall be a combination inoculant containing mycorrhizal fungi (both ecto- and VAM) and beneficial rhizosphere bacteria such as "Injectable for Trees" as manufactured by Plant Health Care, Inc., Pittsburgh, PA, or approved equal, and shall have the following guaranteed analysis of soil amending ingredients: Ectomycorrhizal fungi – one hundred and seventy eight billion (1,780,000,000) spores per one pound, Vesicular Arbuscular Endomycorrhizal (VAM) Fungi – eighty thousand (80,000) spores per one pound, Microbial Content – twenty-four billion (24,000,000,000) colony forming units (cfu) per one pound, Hunic acids – fifteen and eight tenths percent (15.8%), and Microbial Nutrients – sixty-eight and nine tenths percent (68.9%)
- C. Wetting agent and Soil penetrant: shall be 90% derived from *Yucca schidigera* such as Yuccah, as manufactured by Plant Health Care, Inc., Pittsburgh, PA, or approved equal, and shall have the following guaranteed analysis percent by weight: Yucca schidigera plant extract – ninety percent (90%) and Copolymerized alkane oxides (non-ionic surfactant) – ten percent (10%).

PART 3 - EXECUTION

3.01 METHOD

- A. Fertilization shall be implemented after completion of construction operations and after removal of all ground protection and wood chips unless otherwise directed by Director's Representative.
- B. Rates of application shall follow manufacturers' recommendations based on tree DBH and fertilization area. Fertilizer safety precautions shall be followed for all products and used in accordance with the manufacturers' recommendations. Fertilizer ratios should be adjusted based on local knowledge, site conditions, species, age, and health of the tree. The fertilization area shall be defined prior to the application with consideration given to the root accessibility, root location, plant species, and site considerations.
- C. In open lawn areas and areas where there is no root restricting infrastructure: The fertilization area should be from near the trunk, no closer than 3 feet, to near or just beyond the drip line.
- D. In areas where infrastructure has restricted or limited root growth and development: The fertilization area shall be determined by either of two ways, which ever is greatest – Either the fertilization area should be the area of exposed soil within the dripline, or the fertilization area radius shall be determined by multiplying the DBH measured in inches, by 1 foot. For example, a 15-inch tree would have a fertilization area radius of 15 feet.
- E. Surface Applications: Shall be used in instances where there is **NO** existing turf or ground cover and surface run off is **NOT** likely to occur. Fertilizer shall be uniformly distributed within the defined fertilization area and watered into the soil appropriately.
- F. Sub-surface Fertilization applications shall be used in instances where turf or ground covers exist and surface runoff is likely to occur and performed with standard soil injection equipment. Damage to buttress should be avoided. Holes shall be evenly spaced within the defined fertilization area. Liquid injection sites shall be spaced 12 – 36-inches apart and 4 – 8-inches deep, not to exceed 12-inches. The fertilizer

shall be evenly distributed among the holes or injection sites and no closer than 2-inches to the soil surface.

END OF SECTION

SECTION 31 13 14
PROTECT EXISTING TREE ROOTS WITH WOOD CHIPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. The Contractor shall **PROTECT EXISTING TREE ROOTS WITH WOOD CHIPS** in accordance with the plans, and specifications.

Note: Prior to starting work under this item, contact Director's Representative and Consultant Arborist a minimum of 48 hours prior to beginning work.

1.03 RELATED SECTIONS

Section 01 56 39 - Care and Protection of Trees
Section 01 40 10 - Consultant Arborist

1.04 ASIAN LONGHORNED BEETLE QUARANTINE ZONE REGULATIONS

- A. Asian Longhorned Beetle Quarantine Zone Regulations: Due to current Federal, State and NYC DPR policy, any wood waste that is transported must be performed by a Sub/Contractor certified by the New York State Department of Agriculture and Markets to perform tree work within the Quarantine Zone.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood Chips shall be clean chips free of any deleterious material such as ash or insecticide. Chips may be of any wood except wood waste generated from an Asian Longhorned beetle infestation or an Emerald Ash borer infestation. Wood chips produced on the site through authorized pruning and tree removal may also be used for this work. Chips shall be derived from tree material, not from wood waste or by-products like sawdust, shredded palettes, or other debris.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wood Chips for temporary tree root protection during construction shall be applied by hand to the surface of the tree protection area as shown on the plans or as directed by the Landscape Architect in consultation with a Consultant Arborist. Wood chips shall be applied to a uniform depth of six (6") inches over the entire area and shall be so distributed as to create a smooth level cover. The Consultant Arborist shall inspect the work and approve the work, as required to assure tree root protection.

- B. Maintenance of six (6") inch depth: If any wood chips are dislocated or depleted during the course of the work, they shall be immediately replaced with new wood chips within 24 hours of notification at no additional cost to RIOC.
- C. Removal: At the completion of the work of this contract, unless otherwise directed by the Engineer, the Contractor shall remove the wood chips by hand. Wood Chips to protect existing roots shall remain in place and not be moved or removed without written permission of the Engineer until all work which might cause soil compaction or root damage has been completed.
- D. The Contractor may submit a written request to remove by machine to the Director's Representative. No machine removal shall be allowed without prior approval and supervision by Consultant Arborist.

END OF SECTION

SECTION 31 13 15 TEMPORARY WOODEN TREE GUARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Before commencing any work on the site, the Contractor shall erect:
 - a. Temporary Wooden Tree Guards around individual existing trees, in accordance with the plans and specifications. Also, the branches of existing trees shall be tied up, when directed, to prevent injury during work on the site.
 - b. Tree Guards for Groves around groupings of existing trees, in accordance with the plans and specifications. Also, the branches of existing trees shall be tied up, when directed, to prevent injury during work on the site.

1.03 RELATED SECTIONS

Section 01 56 39 – Care and Protection of Trees

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Tree Guard: Lumber shall be Yellow Pine, Douglas Fir or Spruce. Nails shall be galvanized. No paint will be required. All work shall be done in a neat and workmanlike manner to the satisfaction of the Engineer.
- B. High Density Polyethylene (HDPR) mesh: Four (4) Ft Height; Color to be orange.
- C. Line Post/Stake: Line post/Stake shall be No. 4 rebar.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The temporary wooden tree guards shall be installed where shown on the contract drawings. Posts shall be installed at approximately eight feet on center, unless otherwise noted on the plans or directed by RIOC's Representative. They shall be installed with line post/stakes securely attached with galvanized or stainless steel screws to the wooden posts and driven a minimum of two (2') feet into the ground, as directed by RIOC's Representative, without damage to existing trees. If any temporary wooden tree guards or wrap are damaged during the course of the work, they shall be immediately repaired, or replaced by a new temporary wooden tree guard or wrap at no additional expense.
- B. HDPE mesh shall be attached to outside of tree guard, straight and taut, with no stretching or sagging, and secured using galvanized wire or staples. Work is to be done in a neat and workmanlike manner. All extra mesh shall be trimmed or properly secured.
- C. Temporary wooden tree guards and wrap shall remain in place and not be moved or removed without written permission of RIOC's Representative until all work which might cause damage or defacement

has been completed. Upon completion of the work, to the satisfaction of RIOC's Representative, the Contractor shall remove and dispose of all temporary wooden tree guards and wrap.

END OF SECTION

SECTION 31 22 00

GRADING, FILLING AND COMPACTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Grading, filling, proof rolling, compaction testing, and placement and compaction of stone subbase. Removal of all obstructions, piles, foundations, structures and other materials etc. encountered during the course of construction shall be in accordance with Section 312300 of these Specifications.
- B. Draining and/or pumping, if required, to keep excavation free from water.
- C. Stockpiling on site fill material.
- D. Laying out lines and grades by a surveyor for final grading.
- E. Obtaining the services of an approved testing laboratory for compaction testing of fill material.
- F. Cleaning up the site upon completion of Contract work.

1.03 RELATED SECTIONS

Section 02 02 22 – Demolition and Removals
Section 31 12 00 – Clearing and Grubbing
Section 31 23 00 – Earthwork, Unclassified Excavation
Section 31 23 19 – Dewatering
Section 31 23 23 – Borrowed Fill
Section 31 23 33 – Excavating, Backfilling and Compaction for Pipes and Utility Trenches
Section 31 25 00 – Erosion and Sediment Control
Section 32 13 00 – Concrete Pavement

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - ASTM C 117 - Test Method for Material Finer than No. 200 Sieve in Mineral Aggregates by Washing.
 - ASTM C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
 - ASTM D 422 - Test Method for Particle - Size Analysis of Soils.
 - ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb Hammer and 12 inches Drop.
 - ASTM D 1556 -Test Method for Density of Soil in Place by the Sand-Cone Method.

ASTM D 2922 -Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D 3017 -Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D 4318 -Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

1.05 SUBMITTALS

Submit 14 days prior to fill placement:

- A. Equipment: Proposed equipment to be used in compacting fill or backfill material.
- B. Report: If imported fill is used, provide gradation curves. When imported material is used, the contractor shall submit a ticket with each load of material delivered to the site indicating date and time loaded and delivered, source of material, amount in the load and class of material.

1.06 QUALITY ASSURANCE

- A. The Contractor shall not perform proofrolling or final grading operations on soil which is too wet to be properly rolled or compacted as determined by the Engineer.
- B. Fill material for grading will be subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill shall be clean, free from deleterious debris or organic matter, with no more than 15 percent fines passing the No. 200 sieve, and the maximum dimension of the largest stone not exceeding 4 inches.
- B. Select material shall be clean, free from debris and organic matter, with a maximum particle size of 3 in. and not more than 10% by weight passing the ASTM D1140 No. 200 sieve size.

PART 3 - EXECUTION

3.01 PREPARATION AND LAYOUT

- A. Establish extent of excavation by area and elevation; designate and identify datum elevation.
- B. Set required lines and levels.
- C. Maintain benchmarks, monuments and other reference points.

3.02 UTILITIES

- A. Existing utility systems and service lines to remain and those encountered during excavation, if damaged, shall be repaired at the Contractor's expense. Relocation of existing utility systems and service lines, to accommodate the completion of the project, whether on or off the site, shall be the responsibility of the Contractor.

- B. The Contractor shall contact utility companies for information pertaining to locations and construction of existing systems before starting excavation.

3.03 COMPACTION

- A. Prior to placement of fill, the subgrade shall be proofrolled with minimum of two passes by the approved roller that is to be used for backfill placement.
- B. Fill shall be compacted to achieve a density of at least 95 percent of the maximum density as determined by Method D of ASTM D 698 for paved areas and a density of 80 to 85 percent of the maximum density as determined by the method D of ASTM D 698 for planting areas.
- C. Fill shall be placed in maximum eight-inch loose lifts and compacted with a minimum of six passes with an approved vibratory roller.
- D. Do not place and compact fill on frozen subgrade.

3.04 DEWATERING

- A. Prevent surface water and subsurface water or groundwater from flowing into excavations and from flooding project site and surrounding area.
- B. Do not allow water to accumulate in excavations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.

3.05 MATERIAL STORAGE

- A. Stockpile satisfactory excavated materials where directed. Place, grade and shape stockpiles for proper drainage.
- B. Locate and retain soil materials away from edge of excavations.
- C. Storage areas shall be subject to the approval of RIOC's Representative and/or the Engineer.
- D. All excess material not incorporated in the work shall become the property of the contractor and shall be disposed of off site.
- E. No materials shall be stored or stockpiled within the limits of the dripline of any existing tree to remain.

3.06 FIELD TESTS

- A. The Contractor shall engage the services of an approved testing laboratory to determine the in-place density of the soil after compaction is completed.
- B. Compaction tests shall be performed at a frequency of one for every 250 square feet of excavated/backfilled area and street area shown on the Contract Drawings. Test methods may be either Sand-Cone (ASTM D 1556), or nuclear method determined by ASTM D 3017.

- C. If fill has not been sufficiently compacted as determined by in-place density tests, the compaction effort shall be continued and moisture content shall be adjusted as necessary until the specified compaction is obtained.

3.07 CLEAN UP

- A. All surplus materials furnished by the Contractor and all equipment and temporary structures shall be removed from the site by the Contractor. All dirt and rubbish shall be hauled off site and the construction site left clean to the satisfaction of the Engineer.

END OF SECTION

SECTION 31 23 00

EARTHWORK, UNCLASSIFIED EXCAVATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This work shall consist of excavation, disposal, placement and compaction of all materials that are not provided for under another section of these specifications. Additional compensation for excavation of items encountered, regardless of material or description will not be considered.
- B. The excavation shall consist of the excavation and disposal of all materials of any description, encountered in the course of construction unless otherwise specified in these specifications elsewhere. All the excavation shall be done within the limits required for construction.
 - 1. Unclassified excavation shall consist of the excavation and disposal of all materials, of any description, encountered in the course of construction, unless otherwise specified in the contract.
 - 2. Unclassified excavation also includes all obstructions, piles, pile caps, foundations, etc. encountered in the course of construction. The piles encountered shall not be removed but "cut in place" at a 45° Chamfer two feet below subgrade. Pile caps, foundations, structures and other materials encountered during the excavation shall be removed in their entirety, within the limits of the excavation and 2'0" below the subgrade.
 - 3. Excavations within one foot of finished subgrade and below finished subgrade when cutting piles and removing foundations should be done with care to prevent disturbance to subgrade materials.
- C. Excavation shall be done as required for construction of the project.
- D. Rough grading and proofrolling of all subgrade within 1" of required subgrade elevation.
- E. Draining and/or pumping, if required, to keep excavation free from water.
- F. Disposing of off site all excavated material not suitable for backfilling, including rubbish and debris.
- G. Laying out lines and grades by a Licensed Surveyor for final grading.
- H. Cleaning up the site upon completion of Contract Work.

1.03 RELATED SECTIONS

Section 02 02 22 - Demolition and Removals
Section 31 23 19 - Dewatering
Section 31 23 33 - Excavating, Backfilling, and Compaction for Pipes and Utility
Trenches
Section 31 25 00 - Erosion and Sediment Control
Section 32 91 20 – Topsoil
Section 32 92 19 - Seeding

1.02 DEFINITIONS

- A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.
1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
 2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
 - a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
 - b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
 3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
 4. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
 5. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
 6. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor)
 7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 8. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
 9. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by RIOC's Representative.

1.03 SUBMITTALS

Submit for approval within 14 days after Notice to Proceed:

- A. Method of Procedure: Proposed methods, equipment and sequence of operations for excavation.

- C. Quality Control Submittals:
1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for RIOC's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
 2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
 3. Other Aggregates: Name and location of source and soil laboratory test results.

1.04 QUALITY ASSURANCE

- A. The Contractor shall not perform proofrolling or final grading operations on soil which is too wet to be properly rolled or compacted as determined by RIOC's Representative.

1.05 PROJECT CONDITIONS

- A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.
- B. Cold Weather Requirements: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill material shall consist of granular material containing not more than 15% by weight of material passing the No. 200 sieve, and shall be free of organic matter and debris. The fill shall contain no particles exceeding 4 inches in the largest dimension.
- B. Material previously excavated from the site shall not be re-used.

PART 3 EXECUTION

3.01 PREPARATION AND LAYOUT

- A. Establish extent of excavation by area and elevation; designate and identify datum elevation.

- B. Set required lines and levels.
- C. Maintain benchmarks, monuments and other reference points.

3.02 CLEARING AND GRUBBING

- A. Clear and grub the site within the Limit of Work of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.
- B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.03 UNCLASSIFIED EXCAVATION

- A. All excavation is unclassified and consists of removal and disposal of material encountered when establishing required subgrade elevations and/or cutting piles and removing materials encountered unless otherwise noted on the Contract Drawings.
- B. Excavate to elevations required for installation of permanent construction in such a manner to minimize disturbance to subgrade below such elevations.
- C. Where existing pile caps, foundations or other existing construction are encountered, remove them in their entirety.
- D. All piles encountered shall not be removed but "cut in place" at a 45° Chamfer two feet below subgrade. Precautions shall be taken when excavating below subgrade for pile cut-off so that disturbance to adjacent subgrade is minimized.
- E. All debris, excess material, and all material unsuitable for fill, shall be disposed of off site.
- F. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations, limits or dimensions without specific direction of RIOC's Representative. Unauthorized excavation, shall be at the Contractor's expense.
- G. Fill shall be placed at a moisture content within 3% of the optimum moisture content for the material to be placed. Material that is too wet for placement shall not be used as backfill.

3.04 UTILITIES

- A. Existing utility systems and service lines to remain and those encountered during excavation, if damaged, shall be repaired at the Contractor's expense. Relocation of existing utility systems and service lines, to accommodate the completion of the project, whether on or off the site, shall be the responsibility of the Contractor.
- B. The Contractor shall contact utility companies for information pertaining to locations and construction of existing systems before starting excavation.

3.05 SCHEDULING OF WORK TO MINIMIZE SOIL EROSION AND WATER POLLUTION

- A. The Contractor shall prepare and submit to RIOC's Representative for approval, schedules for all excavation, stripping, embankment, fill and grading operations connected with the project in or outside of the project limits. Earthwork shall not be started at a given location until the method and sequencing of all operations are established in accordance with approved plans and approved by RIOC's Representative and per the Erosion Control Drawings.

3.06 DRAINAGE AND GRADING

- A. The Contractor shall provide and maintain slopes, crowns and ditches on all excavation and embankments to insure satisfactory surface drainage at all times. Ditches and other drainage facilities necessary to remove ponded water shall be constructed as soon as practical to have the work area dry during the progression of work. All existing culverts and drainage systems to remain shall be maintained in satisfactory operating condition throughout the course of the work. If it is necessary to interrupt existing surface drainage, sewers or under-drainage, then temporary drainage facilities shall be provided until the permanent drainage work is complete.
- C. Where seepage causes instability of cutslopes, excavation and backfill or other corrective measures shall be performed as ordered by RIOC's Representative. Excavation for the installation of slope protection may be necessary at any time and location throughout the duration of the contract and may not necessarily coincide with the Contractor's performance of the general excavation work.

3.07 COMPACTION

- A. General Requirements

It shall be the Contractor's responsibility to properly place and compact all materials in all sections and to correct any deficiencies resulting from insufficient or improper compaction of such materials throughout the contract period. The Contractor shall determine the type, size and weight of compactor best suited to the work at hand, select and control the lift (layer) thickness, exert proper control over the moisture content of the material, and other details necessary to obtain satisfactory results. During the progression of the work, RIOC's Representative will inspect the Contractor's operations and will permit the work to continue where the following requirements are met:

- 1. Prior to backfilling, the subgrade shall be proofrolled with a minimum of two passes by the approved roller that is to be used for fill placement.
- B. Backfill shall be placed in maximum eight inch lifts and compacted with a minimum of three passes with an approved vibratory roller. Backfill on non-planted areas shall be compacted to achieve a density of at least 95 percent of the maximum density as determined by method D of ASTM D 698. Areas for planting, backfill shall be compacted to achieve a density of 80 to 85 percent of the maximum density as determined by the method D of ASTM D 698.
- C. Overlap passes a minimum of six inches.
- D. In areas where use of roller is not practical, place fill in maximum four inch lifts and compact with approved pneumatic mechanical tampers, or plate vibrators.
- E. Do not place and compact fill on frozen subgrade.

3.08 DEWATERING

- A. Prevent surface water and subsurface water or ground water from flowing into excavations and from flooding project site and surrounding area.
- B. Do not allow water to accumulate in excavations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Convey water removed from excavations in accordance with Specifications 31 23 19 – Dewatering and 02 2 45 – Handling and Treatment of Contaminated Dewatering Fluid.

3.09 MATERIAL STORAGE

- A. The Contractor shall schedule and progress the construction in a manner that will minimize the requirements for storage of excavated materials. If approved by RIOC, the Contractor may stockpile satisfactory excavated materials where directed. Place, grade and shape stockpiles for proper drainage.
- B. Locate and retain soil materials away from edge of excavations.
- C. Storage areas shall be subject to the approval of RIOC's Representative.
- D. All excess material not incorporated in the work shall be legally disposed of off site by the Contractor in accordance with applicable standards and regulations of agencies with jurisdiction and as specified by RIOC.

3.10 RESTORATION

- A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.
- B. Topsoil and seed or sod damaged lawn areas outside the Limit of Work and new lawn areas inside the Limit of Work. Water as required until physical completion of the Work.

3.11 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

- A. Remove from property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

3.12 FIELD QUALITY CONTROL

- A. Compaction Testing: Notify RIOC's Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by RIOC's Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by RIOC's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.13 PROTECTION

- A. Protect graded areas from traffic and erosion and keep them free of trash and debris.

END OF SECTION

SECTION 31 23 10

HAND AND / OR PNEUMATIC EXCAVATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This work shall consist of either hand excavation or excavation with a pneumatic air device in areas where trenching or other excavation is required within the drip line of existing trees and/or sensitive areas. These are areas, where in the opinion of the Engineer, use of a backhoe or tractor would not be appropriate.

1.03 RELATED SECTIONS

- A. Related work is described in the following sections of the specifications:
 - Section 01 56 39 - Care and Protection of Trees
 - Section 02 02 22 - Demolition and Removals
 - Section 31 13 14 - Protect Existing Tree Roots with Wood Chips
 - Section 31 23 00 - Earthwork, Unclassified Excavation
 - Section 31 23 19 - Dewatering
 - Section 31 23 33 - Excavating, Backfilling, and Compaction for Pipes and Utility Trenches
 - Section 31 25 00 - Erosion and Sediment Control

1.04 REFERENCES

- A. Perform all required work in accordance with the applicable rules and regulations and the Codes and Ordinances of Local, State and Federal Authorities.

1.05 SUBMITTALS

Submit for approval within 14 days after Notice to Proceed:

- A. Method of Procedure: Proposed methods, equipment and sequence of operations for excavation.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

- A. Prior to beginning work, the area to be trenched/excavated shall be thoroughly wetted, 24 hours in advance, to minimize dust to the greatest extent possible. Trenching/Excavation shall be accomplished either by hand or with a pneumatic device such as an Air-Spade® CGP System, as manufactured by Concept Engineering Group, Inc. Verona, PA, or approved equal. The Contractor shall provide a compressor unit for operating the pneumatic excavator rated at one hundred fifty standard cubic feet per minute (150 scfm) at ninety pounds per square foot gauge (90 psfg).
- B. All pneumatic excavation shall be as minimal as possible in width and depth, thereby minimizing the impact on tree roots and other areas where the Engineer determines that conventional machine excavation may be detrimental. Different nozzles may be used on the air spade to expedite the work or minimize the amount of airborne material. Depth shall be as indicated on Contract Drawings or as directed by the Engineer. Depths greater than 18" shall require removal of soil by hand shovel, or other appropriate means. Where a pneumatic device is used, care shall be taken to avoid rocks being scattered and inadvertently damaging private or public property. In addition, operators must be equipped with adequate protective clothing and gear, in accordance with manufacturers recommendations.
- C. All tree roots exposed by the pneumatic or hand excavation operation must be kept constantly moist with burlap covered with white plastic and checked a minimum of two (2) times a day, once in the morning and once in the afternoon, for a maximum of forty-eight (48) hours, until backfill is complete as directed by the RIOC's representative. If directed, soaker hoses shall be installed to facilitate properly moist conditions.
- D. Necessary inspections of piping shall be scheduled in advance, especially those involving inspections performed by outside Agencies.
- E. In cases where roots must be cut, the Contractor must receive written approval from RIOC's representative prior to cutting any roots larger than one inch (1") in diameter. Roots must be cut cleanly with pruning shears, loppers, or pruning saws. All root cuts must be approved by the Engineer prior to backfilling.

END OF SECTION

**SECTION 31 23 19
DEWATERING**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Provide dewatering for excavations, installing water mains, storm sewers, drains and sanitary sewers wherever required.
- B. The Contractor shall obtain approvals and dispose of ground water as per N.Y. City and State regulations. Pumping of ground water onto the site is not permitted.

1.03 APPROVALS AND PERMITS

- A. Obtain necessary approvals and permits to dispose of dewatered water.

1.04 RELATED SECTIONS

Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 23 33 - Excavating, Backfilling, and Compaction for Pipes and Utility Trenches
Section 31 41 33 - Sheet piling for Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

- A. The method of dewatering shall be designed by the Contractor so that construction can be performed in the "dry" including placing of concrete, utilities and/or bedding for the slab/utility trenches.
- B. Dewatered water shall be disposed of through proper means far enough from the trench to avoid hazardous conditions.

END OF SECTION

SECTION 31 23 23

BORROWED FILL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 – General Requirements, apply to this Section.

1.02 DESCRIPTION

- A. Under this item, the Contractor shall place Borrowed Fill obtained from Clean Soil Bank by RIOC, on the site to the required lines and grades indicated on the drawings and/or as directed by the Engineer.

1.03 RELATED SECTIONS

Section 31 11 23 – Well-Graded Aggregate Base
Section 31 22 00 - Grading, Filling and Compaction
Section 31 23 00 - Earthwork, Unclassified Excavation

1.04 SUBMITTALS

- A. Soil Analysis: Notarized certificate, provided by RIOC identifying source of soil shall be submitted to the Engineer. For Horticultural Fill, an additional pH test may be required, where directed by the Engineer. Test must indicate a pH not lower than 5.0 nor greater than 7.0. Include suggested amendments to get pH to optimal range if results are not within the required range.
- B. Environmental Test Results: The Contractor shall submit prior to transporting to the site, all environmental test results as provided by RIOC.
- C. Compaction Equipment: The Contractor shall supply data on the compaction equipment to the Engineer five (5) days prior to the intended use date for approval. The compaction equipment shall be able to compact fill material to ninety five percent (95%) maximum dry density at optimal moisture content, in accordance with ASTM D698 Standard Proctor Method (85% in areas to be planted).
- D. Report: The Contractor shall assist an approved independent testing laboratory with performing field and laboratory compaction tests of completed areas of fill if so directed by the Engineer. Field test shall be by the calibrated sand method; the laboratory test shall be as per ASTM D698 or AASHTO T99.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All fill material shall be supplied by RIOC.

1. Clean Fill shall be placed as a subgrade material under paved areas and areas to receive bearing material under foundations. Clean fill shall be defined as material free of pesticides, deleterious substances, organic matter, wood, plastic, cardboard, paper, metal objects, gypsum board, rubble and soil-like pulverized construction, and demolition debris.
2. Horticultural Clean Fill shall be placed at planting areas within five (5') feet of finished grade. Horticultural Clean Fill shall be defined as material free of pesticides, deleterious substances, organic matter wood, plastic, cardboard, paper, metal objects, gypsum board, rubble crushed or pulverized construction, and demolition debris, in addition to concrete and concrete products, asphalt pavement, brick and glass. Only soil and rock shall be deemed acceptable for use as Horticultural Fill.

PART 3 – EXECUTION

3.01 METHOD

PREPARATION AND LAYOUT

- A. Establish extent of excavation by area and elevation; designate and identify datum elevation.
- B. Set required lines and levels.
- C. Maintain benchmarks, monuments and other reference points.

PLACEMENT

- A. Borrow fill shall be placed in a manner that will produce a reasonably well graded mass. The material shall be constructed in successive horizontal layers of eight inches (8") unless written authorization is granted by the Engineer. In any case, horizontal layers shall not exceed twelve inches (12") in depth extending across the entire area of fill. Well graded material shall be so placed and distributed that there will be no pockets of single size solid material. Each layer shall be spread by a Bulldozer or other acceptable equipment and method and shall be thoroughly compacted by rolling with a self-propelled roller of weight required to achieve a density of at least 95% of the maximum density (85% in planted areas) as determined by Method D of ASTM D 698 compaction but weighing not less than ten (10) tons, and shall be thoroughly and uniformly compacted to the satisfaction of the Engineer before the next successive layer is placed. In places where the character of the material makes the use of a roller impractical or where drains or other construction may be damaged, a lighter roller or manually guided compactor/vibratory plate type may be substituted to compact the fill to the satisfaction of the Engineer.
- B. Hollows and depressions which develop during the process of rolling and compacting shall be filled with acceptable material and the subgrade recompacted. This process of filling and compacting shall be repeated until no depressions develop. The entire work of compacting shall be performed to the satisfaction of the Engineer.
- C. After compacting, the area shall be left in a uniformly compacted, smooth, dense, true, firm, satisfactory, and evenly finished condition, free of irregularities, voids, compaction planes, ridges, or loose material. Deficiencies resulting from improper placement or compaction shall be fully corrected by the Contractor. No additional compensation will be made for settlement.

3.02 TESTING REQUIREMENTS

- A. Documentation indicated environmental test and soil analysis shall be provided by RIOC and submitted to the Engineer.
- B. The analytical results of the samples collected from the proposed fill material shall comply with Recommended Soil Cleanup Objectives (RSCO's) listed in NYCRR Part 375 Table 6.8 (b.).
- C. In addition, once material has arrived at the site the following procedures must be followed:
 - 1. All approved fill materials stockpiled at the site must be clearly segregated and identified on-site, so as to assure proper placement.
 - 2. All stockpiled fill materials must comply with all erosion and dust control requirements of the NYSDEC – approved SWPPP for the site, until material has been placed in final position and grades.

END OF SECTION

SECTION 31 23 33

EXCAVATING, BACKFILLING AND COMPACTION FOR PIPES AND UTILITY TRENCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. The excavating, backfilling and compaction for pipes and utility trenches.
- B. Removal of all obstructions, piles, foundations, structures etc. encountered during the course of construction in trenches. Pile caps and foundations in their entirety for the full width of the trench and/or excavation. Piles shall not be removed but cut at 45-degree chamfer two feet below subgrade.
- C. Excavations within one foot of finished subgrade and below finished subgrade when cutting piles and removing foundations should be done with care to prevent disturbance to subgrade materials.
- D. To furnish and deliver select fill/backfill, place and compact select fill/backfill in the excavated trench for sewers and water mains as shown on the plans in accordance with the specifications.
- E. Excavation to the lines, grades and limits shown on the Contract Drawings.
- F. Draining and/or pumping, if required, to keep excavation and trenches free from water.
- G. Stockpiling on site and disposing off site excess suitable excavated granular material, disposing off site of excavated material not suitable for backfilling, including rubbish and debris.
- H. Laying out lines and grades, by survey, for drainage pipe installation and final grading.
- I. Backfilling and compaction of stone bedding and select fill/backfill material to the lines and grades indicated on the Contract Drawings.
- J. Protection of existing utilities and structures to remain that are exposed during excavation.
- K. Cleaning up the site upon completion of Contract work.

1.03 RELATED SECTIONS

Section 31 11 23 - Well-Graded Aggregate
Section 31 22 00 - Grading, Filling and Compaction
Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 23 19 - Dewatering
Section 31 23 23 - Borrowed Fill
Section 31 41 33 - Sheet piling for Utility Trenches
Section 33 01 00 - Maintaining and Protecting Existing Utilities
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 42 16 - Precast Reinforced Concrete Pipe on Concrete Cradles

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - ASTM C 117 - Test Method for Material Finer than No. 200 Sieve in Mineral Aggregates by Washing.
 - ASTM C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
 - ASTM D 422 - Test Method for Particle - Size Analysis of Soils.
 - ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb Hammer and 12-in. Drop.
 - ASTM D 1556 -Test Method for Density of Soil in Place by the Sand-Core Method.
 - ASTM D 2922 -Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth)
 - ASTM D 3017 -Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth)
 - ASTM D 4318 -Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

1.05 SUBMITTALS

Submit 21 days prior to commencement of trench excavation:

- A. Shop Drawing: Where sheet piling or sheeting is required, submit detailed shop drawings and design calculations of the sheeting and bracing system to the Engineer for review. Shop drawings and calculations shall be prepared by a Professional Engineer licensed in the State of New York who has a minimum of five years experience in the design of soil retaining structures. The shop drawings shall be sealed and signed by a Professional Engineer.

Submit 14 days prior to installation of stone bedding:

- A. Calculation: Gradation curves for the stone bedding to be used in supporting drainage structures.

Submit 14 days prior to placement of backfill:

- A. Method of Procedure: Proposed equipment to be used in compacting trench select fill/backfill material.
- B. If imported select fill is used, provide gradation curves. When imported material is used, the Contractor shall submit a ticket with each load of material delivered to the site indicating date and time loaded and delivered, source of material, amount in the load and class of material. This will not be basis for payment.

Submit 14 days prior to installation of stone subbase:

- A. Report: Compaction test results of backfill material used in trench backfilling.

1.06 QUALITY ASSURANCE

- A. The select fill/backfill material for backfilling trenches will be subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stone Bedding: Crushed limestone or trap rock conforming to the following gradation determined in accordance with ASTM C 136 and C 177:

<u>Sieve Size</u>	<u>Total Passing Percent by Weight</u>
2½ inch	100
1 inch	60 - 100
¾ inch	45 - 85
⅜ inch	30 - 60
No. 10	14 - 30
No. 40	3 - 15
No. 200	0 - 3

Stone bedding placed within 5-feet of finished grade shall be free of all concrete and concrete products, asphalt pavement, brick and glass. Stone bedding shall meet requirements of Specification 31 23 23 – Borrowed Fill.

Recycled concrete aggregate shall not be acceptable.

- B. Select Filling and Backfilling materials whose composition is inorganic soil, blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof, shall be considered suitable materials provided it is free of shale or other soft, poor durability particles.

The material within the top one (1') feet of subgrade shall have the following gradation:

<u>Sieve Size</u>	<u>Total Passing Percent by Weight</u>
4 inch	100
1¼ inch	30 - 75
No. 40	5 - 40
No. 200	0 - 10

Excavated materials not complying with the above NYCDOT specifications shall be considered unsuitable for fill and shall be removed from the job site to an approved dump.

PART 3. - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Prior to excavation, investigation shall be made by the Contractor to determine the exact locations of existing underground structures and utilities. The Contractor shall notify all affected utility companies in the area a minimum of 3 working days before commencing work.
- B. Contractor shall excavate with extreme caution when excavating near or above locations of known or suspected pipe and utilities.

- C. Do not traverse paved areas with tracked vehicles or equipment such as carry-all scrapers which may damage such pavement unless protected to the satisfaction of the Engineer.

3.02 EXCAVATION

- A. Open cut from surface, as shown on the Contract Drawings, to elevations required for installation of pipes.
- B. Existing foundations, pile caps, or other existing construction shall be removed in its entirety within the limits of the excavation and 24" below subgrade. Piles are to be cut off at a 45° chamfer two feet below subgrade.

3.03 SHEETING AND SHORING

- A. Where required for protection of adjacent utilities and structures or where required for performance of the Work, secure the sides of excavations against movement as follows:
 - 1. Install sheet piling or sheeting held in place by waling and bracing members. Top of sheeting shall extend at least six inches above ground.
 - 2. Do not excavate below the bottom of sheet piling or sheeting except as necessary to install sheeting.
 - 3. Comply with all Local, State and Federal regulations having jurisdiction.
- B. Trenches may be widened to provide stable slopes or protected by use of a portable trench shield in lieu of sheeting.
- C. Sheeting and Shoring shall consider all overburden, and other surcharge loads.

3.04 EXISTING STRUCTURES AND UTILITIES

- A. Structures and utilities which are to remain shall not be disturbed without consent of Engineer and representatives of affected utilities. Brace and shore structures and utilities when exposed to prevent damage. Any damage shall be immediately reported to the affected utility company and the Engineer. The Contractor will be responsible for making repairs to the satisfaction of the Engineer and the utility company.
- B. Any interference between the existing utilities to remain and the proposed installation not shown on the Contract Drawings shall be immediately reported to the Engineer and the utility company. The Contractor shall be responsible for relocating the affected existing utilities as approved by the Engineer and the utility company.
- C. Perform excavation around and adjacent to existing structures, pipes and conduits which are to remain in place, without damage to or movement of existing construction. When excavation is to be performed under such structures pipes and conduits, support them in a manner as approved by the Engineer and the utility company to ensure uninterrupted operation of the supported items.

3.05 ABANDONED UTILITIES

- A. Close open ends of abandoned underground utilities with sufficiently strong closures to withstand pressures which may result after closing.
- B. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs, or other suitable method for the type of material and size of pipe. Do not use wood plugs.
- C. Close open end of concrete and masonry utilities with not less than eight inches thick brick masonry bulkheads, constructed to completely fill the opening.

3.06 DEWATERING

- A. The Contractor shall provide and maintain at his own expense ample means and equipment such as pumps, drains and sumps for dewatering and properly disposing of water entering the trenches, and other parts of the work.
- B. Prior to placement of any permanent construction or backfilling any excavated area, lower the water table in said area to one foot below the elevation of the required subgrade and maintain this condition until the construction or pavement is placed thereon.
- C. Dewatering shall be done in an approved manner such that the subgrade can be trimmed, foundation materials, pipe or concrete placed in the dry, without disturbing bearing materials, and water from the excavation shall be disposed of in such manner that will cause no injury to property or inconvenience to the public.
- D. Dewater in a manner to prevent the loss of ground due to the migration of soil fines into the dewatering system.

3.07 STORING MATERIALS AND CARE OF STRUCTURES

- A. All excavated and other materials shall be so placed as not to endanger the work, and so that free access may be had at any time to all parts of the trench and to all hydrants and gates on pipes in the vicinity, and shall be kept neatly in piles, so as to inconvenience as little as possible public travel or the adjoining tenants.
- B. Storage areas shall be subject to the approval of RIOC and/or the Engineer.

3.08 ALIGNMENT AND GRADE

- A. Finished trench bottoms shall be true and even and shall be maintained to lines and grades established by the plans. Trench bottoms for gravity sewer or drainage pipes shall be checked for alignment and grade before laying pipe.

3.09 STONE BEDDING

- A. Stone bedding shall be required for all ductile iron water and sewer pipe and manholes and shall meet the gradation requirements of this Section. Bedding shall have a minimum compacted thickness as shown on the Contract Drawings. Bedding material shall be compacted in four-inch lifts using a minimum of six passes of an approved vibratory tamper per lift.
- C. Stone bedding shall be placed in filter fabric as shown on the plans and approved by the Engineer.

3.10 BACKFILL AND COMPACTION

- A. Backfill shall be placed and compacted in eight-inch loose lifts. Compact surface with a minimum of six passes of an approved vibratory steel roller operated at a speed not to exceed 3 miles per hour and at the optimum operating frequency recommended by the manufacturer.
- B. Overlap passes of roller a minimum of six inches.
- C. Subgrade, excavated surfaces, existing surfaces, backfill and fill shall be compacted to achieve a density of at least 95 percent of the maximum density as determined by ASTM D 1557.
- D. Moisture content of backfill and fill material shall be within a range of plus or minus two percent of optimum.
- E. Trench backfill material shall be as specified in Part 2 of this Section and shall be placed to a height of not less than one foot over the top of the pipe, or as shown on the Contract Drawings.
- F. In areas where use of roller is impractical, backfill material shall be placed and compacted in four inch loose lifts equally on both sides of the pipe. Each layer shall be compacted with an approved mechanical tamper in a manner so as not to disturb the line and grade of pipe.
- G. Do not place fill or backfill on frozen subgrade.
- H. The surface of filled or backfilled areas which are to receive pavement or on which a structure is to be placed, shall be within plus or minus 1/2 inch of the elevations shown on the Contract Drawings and shall be free of depressions or projections greater than 1/2 inch when tested with a 16 foot straight edge.
- I. The surface of filled areas at other locations shall be within plus or minus one inch of elevations shown on the Contract Drawings unless a closer tolerance is necessary to meet requirements of other Sections of the specifications or the Contract Drawings.

3.11 METHOD

- A.
 - 1. Where shown on the Contract Drawing, imported clean select fill/backfill shall be placed in the space to be wrapped with filter fabric.
 - 2. The select fill/backfill shall be compacted to a minimum of 95% of the standard Maximum Proctor Density.
 - 3. Tamping for all select fill/backfill shall be performed by mechanically powered equipment designed for that purpose, except in the immediate area of underground facilities where such tamping may be impractical. The select fill/backfill within the immediate area of such facilities shall be wetted and lightly hand-tamped to assure the specified density. The immediate area shall be considered to be a maximum of eighteen (18) inches around the underground facility. The Contractor shall provide sufficiently wetted lifts with as many strokes as required to achieve the specified density.
- B. Sewer Trench

All trenches and excavation shall be backfilled immediately after the structures are built.

C. Method for Depositing All Backfill

1. Sewers for which permission to backfill has been given, shall be covered for a depth of at least two (2) feet over the top of the sewer before the completion of each day's work. This select fill/backfill shall be deposited on all sides of the sewer in layers not exceeding two (2) feet in depth and solidly compacted by mechanical tamping or other approved means in such a manner as to avoid damage to the sewer.
2. Select fill/backfill for the full depth of the trench taken two (2) feet above the top of the sewer shall be deposited in successive layers not exceeding two (2) feet in depth. Each succeeding layer shall be compacted by puddling (flooding with water). After puddling, the trench which has been completely backfilled shall be further compacted by the use of an 8-10 ton heavy rubber-tired truck or other approved equipment.

D. Backfilling Around Sheet piling

1. When sheet piling is drawn all cavities remaining in or adjoining the trench shall be solidly filled. When sheet piling is to be left in place, all cavities behind such sheet piling shall be solidly filled.
2. Backfill shall proceed simultaneously with the withdrawal of sheet piling and as each layer is compacted in accordance with the procedure or procedures described above. Withdrawal of sheet piling below levels previously backfilled is prohibited.

3.12 REMOVAL OF SURPLUS MATERIAL AND SITE CLEAN UP

- A. All surplus materials excavated from the site or furnished by the Contractor shall be characterized, tested and shall be removed from the site by the Contractor in accordance with the following requirements and the Project RASP/CHASP. All dirt and rubbish shall be hauled off site and the construction site left clean to the satisfaction of the Engineer.
 1. The Contractor shall characterize, through an NYS certified independent testing laboratory, all soil and waste materials to be removed from the site and disposed of that cannot be considered standard C&D materials, for approval by the disposal site, prior to hauling.
 2. Copies of all test results and letters of acceptance from the accepting waste disposal facility for the materials to be disposed of must be provided to RIOC's Representative prior to removal of associated materials from the site.
 3. The Contractor shall be responsible for all permits required by NYCDOT for hauling of materials in accordance with the test result characterizations, and all regulatory requirements for handling, transporting and disposal.
 4. Copies of all truck manifests and acceptance by the waste disposal facility for materials removed from the site shall be required for each payment requisition period in which the Contractor seeks payment for the removal and disposal of materials off site.

END OF SECTION

SECTION 31 25 13

EROSION AND SEDIMENT CONTROL

PART 1. – GENERAL

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.2 DESCRIPTION

- A. Contractor to prepare and submit an Erosion and Sediment Control Plan and Storm Water Pollution Prevention Plan (SWPPP) for the project. The SWPPP will provide details for soil erosion and sediment control measures to be incorporated into the project and establish the types and frequency of inspections that are proposed with the project.
- B. Furnish and install the erosion/sedimentation controls required during construction.
- C. Provide erosion and sediment control structures including but not limited to silt fence, hay bales, temporary swale, sediment basin, curb drop inlet, earth dike, pipe slope drain, stabilized construction entrances, dust control, etc. The Contractor shall provide additional erosion control measures if directed by the Engineer.
- D. Comply with State, County and City regulations for erosion and sediment control during construction and to protect the uncovered soil from erosion.
- E. If required, Contractor will obtain approval of the Storm Water Pollution Prevention Plan (SWPPP) from NYSDEC.
- F. The Contractor shall be responsible to construct and maintain any additional soil erosion control measures approved by NYSDEC; Owner will arrange to have inspections performed in accordance with the SWPPP requirements and will maintain on-site documentation records required by the SWPPP.

1.3 SUBMITTALS

- A. Submit Erosion Control Plan.
- B. Submit Storm Water Pollution Prevention Plan (SWPPP).
- C. Submit shop drawings for sediment control structures.
- D. Material certificates for silt fence and filter cloth.

1.4 REFERENCES

- A. New York Guidelines for Urban Erosion and Sediment Control, NYSSCS.

1.5 PERMITS

- A. The Contractor shall obtain all necessary permits for disposing of storm water.

1.6 RELATED WORK

- A. Related work is described in the following section of the specifications:

Section 312334: Excavation, Backfill and Compaction for Pavements

PART 2. - PRODUCTS

2.1 MATERIAL

- A. Silt Fence

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	110	ASTM D4632
Elongation at Failure (%)	20	ASTM D4632
Mullen Burst Strength (PSI)	300	ASTM D3786
Puncture Strength (lbs)	60	ASTM D4833
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve ASTM D 4751
UV Residual (%)	70	ASTM D4355

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.
3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.
4. Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per details shown.

- B. Hay bales shall be minimum 3 feet high and wire or nylon bound.

- C. Stakes: Wooden stakes shall be 2" x 2" x 4 to 5 feet long.

PART 3. - EXECUTION

3.1 INSTALLATION

- A. Silt Fence shall be installed as specified below.
 - 1. Dig a small trench 6 to 12 inches deep.
 - 2. Woven wire fence to be fastened securely to fence posts with wire ties or staples.
 - 3. Unroll prefabricated silt fence, position the post in the back at 8 feet Center to Center in the back of the trench (down hill side), and drive the post 12 to 18 inches deep.
 - 4. Lay the bottom 6 to 12 inches of the fabric into the trench to prevent undermining by storm water runoff.
 - 5. Filter cloth to be fastened securely to woven wire fence with ties spaced every 24" at top and mid section.
 - 6. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
 - 7. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.
 - 8. Backfill trench and compact.
- B. Hay Bales shall be placed as specified below.
 - 1. Bales shall be placed in a row with ends tightly abutting the adjacent bales.
 - 2. Each bale shall be embedded in the soil a minimum of 4".
 - 3. Bales shall be placed parallel to the contour or as shown.
 - 4. Bales shall be securely anchored in place by stakes or re-bars driven through the bales. The first stake in each bale shall be angled toward previously laid bale to force bales together.
 - 5. Stakes or rebars shall be 12 to 2 feet in the ground.
 - 6. Inspection shall be frequent and repair or replacement shall be made promptly as needed.
 - 7. Bales shall be removed when they have served their usefulness so as not to block or impede storm flow or drainage.
- C. The plan shall include a stabilized construction entrance at all the entrance and exit points of the construction site as specified below.
 - 1. Filter cloth shall be to the fabric properties shown below:

Fabric Properties	Light Duty Roads Grade Subgrade	Heavy Duty Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Burst Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 (modified)
Equivalent Opening Size	40-80	40-80	US Std Sieve CW- 02215
Aggregate Depth (in)	6	10	--

2. Stone Size: Use 2" stone, or reclaimed or recycled concrete equivalent.
3. Length: Not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).
4. Thickness: Not less than six (6) inches.
5. Width: Twelve (12) foot minimum, but not less than the full width at points where ingress or egress occurs. Twenty-four (24) foot if single entrance to site.
6. Filter Cloth: Will be placed over the entire area prior to placing of stone.
7. Surface Water: All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
8. Maintenance: The entrance shall be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. All sediment spilled, dropped, washed or tracted onto public rights-of-way must be removed immediately.
9. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
10. Periodic inspection and needed maintenance shall be provided after each rain.

D. Dust Control

1. To prevent surface and air movement of dust from disturbed soil surfaces that may cause offsite damage, health hazards, and traffic safety problems shall be implemented as follows:
 - a. Vegetative Cover: Buffer areas of vegetation should be left where practical.
 - b. Mulch: To cover disturbed areas by mulch (including gravel mulch).
 - c. Sprinkling: The site may be sprayed until the surface is wet.

3.2 MANUFACTURER

Silt Fence

Suggested manufacturer or approved equal:

Carthage Mills
1821 Summit Road
Cincinnati, Ohio 45237
PH 513 761-4141
FAX 513 761-1222

3.3 FIELD QUALITY CONTROL

A. The Contractor shall not commence site disturbance work until:

1. Contractor's Erosion and Sediment Control Plan has been approved by Owner.
2. Erosion and Sediment Control measures have been installed to Owner's satisfaction.

END OF SECTION

SECTION 31 32 19

GEOTEXTILE FOR DRAINAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under this Item, the Contractor shall furnish and install GEOTEXTILE – DRAINAGE in accordance with the drawings and specifications, as directed by the Engineer

1.03 SUBMITTALS

- A. PRODUCT DATA:

The Contractor shall submit manufacturer's data with sufficient detail to demonstrate compliance with the requirements of this specification. Contractor must examine soil condition on site and select the appropriate geotextile to submit and to use for the site.

- B. SAMPLE:

The Contractor shall furnish two (2) labeled samples of the geotextiles intended for use in the work for approval and the Engineer's use. The label shall include the manufacturer's product name, the type of fabric, and the weight of grade of the material. Geotextiles used in the work shall conform to the approved samples

- C. SOIL TESTING:

Where quantity of Geotextile - Drainage exceeds four hundred and fifty (450) square yards, the Contractor shall pay for soil testing of existing soil prior to the selection and submittal of the specific geotextile. The Contractor shall furnish a certified report by an approved Materials Testing Laboratory showing the in-situ soil condition. Contractor shall submit to the Designer the result of the sieve analysis indicating percent passing through a standard No. 200 US Sieve along with the Geotextile sample. The grain size analysis of in-situ soil shall be in accordance with AASHTO T88. Contractor shall obtain a minimum of one soil sample per one hundred and fifty (150) square yard of area covered. The Contractor shall bear responsibility for all costs associated with laboratory testing.

PART 2 - PRODUCTS

2.01 GEOTEXTILE – DRAINAGE:

- A. Drainage application is defined as a soil to geotextile system that allows for long-term, adequate liquid flow normal to the geotextile with limited soil loss across the plane of the geotextile.
- B. Fibers used in the manufacture of drainage geotextiles, and the threads used in joining geotextiles by sewing, shall consist of long-chain, synthetic polymers, composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to

each other, including selvages. The geotextile shall have no tears or defects which adversely alter its physical properties. Geotextiles used in drainage applications shall be Class 2 and shall conform to the following AASHTO-M-288 properties for drainage geotextiles:

		<i>In situ Soil requirements-% passing through a Standard No. 200 US sieve</i>					
Property	ASTM Test	Less than 15%		15% to 50%		Greater than 50%	
Structure		Woven	Non-Woven	Woven	Non-Woven	Woven	Non-Woven
Elongation	ASTM D4595	<50%	>=50%	<50%	>=50%	<50%	>=50%
Grab Strength (Min.)	ASTM D4632	1100N (247 LBF)	700N (157 LBF)	1100N (247 LBF)	700N (157 LBF)	1100N (247 LBF)	700N (157 LBF)
Tear Strength (Min.)	ASTM D4533	400N (90 LBF)	250N (56 LBF)	400N (90 LBF)	250N (56 LBF)	400N (90 LBF)	250N (56 LBF)
Puncture Strength (Min.)	ASTM D4833	400N (90 LBF)	250N (56 LBF)	400N (90 LBF)	250N (56 LBF)	400N (90 LBF)	250N (56 LBF)
Permitivity (Min.)	ASTM D4491	0.51/sec.		0.21 / sec.		0.11 / sec.	
Apparent Opening Size (Max.)	ASTM D4751	0.43 mm (0.01645 inch) Std No. 40 sieve		0.25 mm (0.0098 inch) Std. No. 60 sieve		0.22 mm (0.0083 inch) Std. No. 70 sieve	

- C. Geotextiles shall be FX-60HS (non-woven) as manufactured by Carthage Mills, Cincinnati, OH, or by 160N (nonwoven) Mirafi, Inc., Charlotte, NC, or TerraTex N06 (nonwoven) by Hanes Geo Components, Edison, NJ, approved equal. Contractor shall submit product data showing that the proposed geotextile is suitable for the soil condition on site

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Prior to installation of geotextile, the ground shall be prepared by removing stumps and other organic material, along with any large boulders and sharp objects which may tear or damage the fabric. Install geotextile at elevations and alignments as indicated on the drawings or as directed by the Resident Engineer. The drainage geotextile shall be placed loosely with no wrinkles or folds. Care will be taken to place the geotextile in intimate contact with the soil so that no void spaces occur between the geotextile and trench or ground. Where the geotextile is to be installed in a trench, the geotextile shall be overlapped at the top of the trench, twelve (12") inches or the full width of the trench, whichever is less

3.01 METHOD

- A. Prior to installation of geotextile, the ground shall be prepared by removing stumps and other organic material, along with any large boulders and sharp objects which may tear or damage the fabric. Install geotextile at elevations and alignments as indicated on the drawings or as

directed by the Resident Engineer. The drainage geotextile shall be placed loosely with no wrinkles or folds. Care will be taken to place the geotextile in intimate contact with the soil so that no void spaces occur between the geotextile and trench or ground. Where the geotextile is to be installed in a trench, the geotextile shall be overlapped at the top of the trench, twelve (12") inches or the full width of the trench, whichever is less

- B. If the geotextile is damaged during installation, the rupture shall be removed and the damaged area shall be covered with a patch of new fabric which will overlap the undamaged fabric approximately six (6") inches in all directions. All repaired fabric surface costs will be deemed part of the price bid

END OF SECTION

SECTION 31 41 33

SHEETING FOR UTILITY TRENCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. To furnish, deliver and install sheeting necessary for protection of excavations including utility trenches in accordance with the plans, as per NYCDEP standards and specifications, OSHA requirements.

1.03 SUBMITTALS

- A. Shop Drawing: Submit shop drawings for the type of sheeting to be used for the project area, complete with structural design and installation precautions, etc. for the Engineer's approval. All structural designs, drawings and supporting documentation shall be signed and sealed by a Professional Engineer licensed in the State of New York.

1.04 RELATED SECTIONS

Section 31 23 19 - Dewatering
Section 31 23 33 - Excavating, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 42 16 - Precast Reinforced Concrete Pipe on Concrete Cradles
Section 33 44 00 - Catch Basin Connections
Section 33 49 00 - Structures for Storm Sewers

PART 2 - PRODUCT

2.01 MATERIAL

- A. The Contractor has an option to use wood or metal sheeting. Each type of sheeting planned for use in the project area has to be pre-approved.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Sheeting shall be installed as per approved plans.

END OF SECTION

SECTION 32 01 00

SAWCUTTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This work shall consist of sawcutting existing pavement to remain as required to install new utilities and/or construct new paving, curbing, fencing etc.

1.03 RELATED SECTIONS

Section 02 02 22 - Demolition and Removals
Section 31 23 33 - Excavating, Backfilling and Compaction for Utility Trenches
Section 33 01 00 - Maintaining and Protecting Existing Utilities

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 METHOD

- A. The existing pavement shall be saw cut with a straight saw cut edge at the locations and limits shown on the plans.
- B. Sawcutting shall be done in a workmanlike manner and to the satisfaction of RIOC's Representative.

END OF SECTION

SECTION 32 12 16

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 RELATED SECTIONS

Section 31 11 23 – Well-Graded Aggregate Base
Section 31 23 00 – Earthwork, Unclassified Excavation
Section 32 17 23 - Pavement Marking
Section 32 16 13 – Concrete Curb

1.02 SUBMITTALS

- A. Product Data: Manufacturer's name, specifications, and installation instructions, for each item specified.
- B. Quality Control Submittals:
 - 1. Plant name and location of asphalt concrete supplier.

1.03 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Discontinue paving when surface temperatures fall below requirements listed in DOT Table 402-2.
 - 2. Do not place asphalt concrete on wet surfaces, or when weather conditions otherwise prevent the proper handling or finishing of bituminous mixtures as determined by RIOC's Representative.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphalt Concrete Paving: Conform to DOT Section 400 Hot Mix Asphalt.
 - 1. Top Course: DOT, Table 403-1, Type 7.
 - 2. Binder Course: DOT, Table 403-1, Type 3.
 - 3. Base Course: DOT, Table 403-1, Type 1.
- B. Asphalt Cement Tack Coat. Tack coat not required if Binder and Top courses are poured the same day.

PART 3 EXECUTION

3.01 ASPHALT CONCRETE PAVING

- A. Construct asphalt pavement in accordance with DOT, Section 402-3 except as follows:
 - 1. Paragraph 402-3.06: Change 1250 sq. meters to read 420 sq. meters.

END OF SECTION

SECTION 32 13 00

CONCRETE PAVEMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Construct concrete sidewalks, pigmented and unpigmented, as shown on the plan in accordance with specifications.
- B. Thickness of concrete sidewalk shall be 5" with reinforcement. Thickness of stone base shall be 6", unless otherwise noted.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Concrete Design Mix: Submit proposed concrete design mix together with name and location of batching plant at least 28 days prior to the start of concrete work.
 - 2. Color concrete color chart to select color concrete samples for a, b and c.
 - 3. Portland Cement: Brand and Manufacturer's name.
 - 4. Air-entraining Admixture: Brand and manufacturer's name.
 - 5. Water-reducing or High Range Water-reducing Admixture: Brand and manufacturer's name.
 - 6. Curing and Anti-Spalling Compound: Manufacturer's specifications and application instructions.
 - 7. ADA Detectable Warning Surface: Manufacturer's specifications, product data, test reports, method of installation, and maintenance instructions.
- B. Samples:
 - 1. Colored admixture – Color samples – Submit color chip samples of colors selected in manufacturer's provided color chart.
 - 2. Welded Wire Mesh
 - 3. Bar Reinforcement: 12 inch minimum.
 - 4. ADA Detectable Warning Surface: Two samples, the same color as the material to be installed, 6 inches x 8 inches minimum.
- C. Shop Drawings:
 - 1. Layout for pavement including profiles, dimensions, joining details, inserts, anchors and reinforcing placement.

2. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

D. Mock- Ups

1. Provide mock-up installation providing three pavement sections from joint to joint complete; mock-up shall be at least 8' in length and the width of the pavement shown on the drawings. The Architect shall review the installation after finishing and drying (not less than seven days) for: confirmation of correct materials, color, finish, condition and cleanliness of materials, pattern, setting method, joint size and general workmanship. The Contractor shall be re-quired to correct any deficiencies identified by the Architect before proceeding with the completion of work.

1.04 RELATED SECTIONS

A. Related work is described in the following sections of the specifications:

Section 03 30 00 – Cast-In-Place Concrete
Section 31 22 00 – Grading, Filling and Compaction
Section 31 11 23 – Well-Graded Aggregate Base
Section 31 32 19 – Geotextile for Drainage
Section 31 22 00 – Earthwork, Unclassified Excavation
Section 32 13 73 - Joint Fillers

1.05 QUALITY ASSURANCE

A. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete shall conform with N.Y.C.D.O.T. Standard Specifications for concrete sidewalks.
- B. Crushed broken stone for foundation shall be of the following gradation:

<u>Sieve Size</u> <u>(inches)</u>	<u>Percent Weight Passing</u>
2	100
1½	90 - 100
1	20 - 55
¾	0 - 15
⅜	0 – 5

and clean, hard, unweathered stone of uniform quality. It shall consist of fragments roughly cubical or pyramidal in shape and shall be crushed from ledge rock.

C. Fine Aggregate: Clean, inert silica sand, ASTM C33.

Gradation: Sieve Retained

#4	0-5	%
#8	10-20	
#16	20-40	
#30	40-70	
#50	70-85	
#100	93-97	

D. Colored admixture for integrally colored concrete and ADD Alternate 1 - exposed aggregate concrete

1. Manufacturer: L.M. Scofield Company, Douglasville, Georgia (800) 800-9900 or approved equal.

2. Materials:

a. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and UV resistant.

b. Colored admixture shall conform to the following:

1) ASTM c979 - standard specification for pigments for integrally colored concrete.

2) ASTM c494 - standard specification for chemical admixtures for concrete

3) AASHTO m194 - chemical admixtures

E. Acceptable product: Chromix admixture as manufactured by the L.M. Scofield Company, Douglasville, Georgia, are considered to conform to the requirements of this specification.

F. Color shall be selected during the submittal process for colors A, B, and C in the contract drawings.

G. Forms:

1. Steel, wood, glass fiber, or other suitable material of size and strength to Resist movement during concrete placement and to retain horizontal and Vertical alignment until removal. Use straight forms, free of distortion and Defects, extending the full depth of concrete.

2. Coat forms with form release agent which will not discolor or deface the Surface of the concrete.

3. Use flexible spring steel forms or laminated boards to form radius bonds as required.

H. Expansion joint materials: expansion joint materials comply section 32 13 73 Joint filler

I. Anti-spalling compound: 50 percent (by volume) boiled linseed oil and 50 percent (by Volume) commercial grade kerosene or mineral spirits.

J. Concrete that illustrates a range of the following stone types (percentages Are by weight):

1. All coarse aggregate for concrete shall consist of sound, washed, durable rock, free from objectionable coatings and frozen and cemented lumps. The percentage of deleterious substances shall not exceed the following values, and the sum of percentages of all deleterious substances, shall not exceed 5.0 percent.

K. Air-entraining admixture: ASTM C260. Acceptable products: W.R. Grace and Co (Darex AEA or Daravair.), or Master Builders Co. (MB-VR or Micro-Air).

L. Water reducing Admixture: ASTM C494 Type A containing max 0.1% chloride ions. Acceptable products: W.R. Grace and Co. (I WRDA), Master Builders Model (Pozzolith Normal or Polyheed), Sika Corp. (Plastocrete 161)

M. Pigmenting material shall be dispersible Carbon Black stable readily mix in concrete. It shall be free from substances having a deleterious effect on concrete mixtures and shall conform with N.Y.C.D.O.T. standards. It shall be mixed at the plant. No mixing of pigment on-site will be permitted.

O. Bar Supports: Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.

P. Steel Bar Reinforcement: Steel bar reinforcement between expansion joints shall meet the requirements of the applicable paragraphs of the N.Y.C. Building Code and the latest ASTM specification for "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement", Designation A-615 and in accordance with the item "Steel Bar Reinforcement" Reinforcement shall be of sizes and dimensions shown on the plans.

Q. Metal expansion caps: furnish for one end of each dowel bar in expansion joints. Design caps with one end closed and a minimum length of 3 inches (75 mm) to allow bar movement of not less than 1 inch (25 mm), unless otherwise indicated.

R. Epoxy resin grout: fs mmm-g-650.

S. Welded wire mesh: Steel fabric reinforcement shall meet the requirements for cold drawn steel wire for concrete reinforcement described in the latest revision of ASTM Designation A-1064. All welded steel fabric shall comply with ASTM A-1064, latest revision. Steel fabric shall consist of longitudinal members with transverse members at right angles there to, six inches (6") by six inch (6") 8/8 welded wire mesh. All Steel fabric shall be delivered in flat sheets or rolls of such width as to fit the designated pavement slab area, not more than three inches (3") from the edges of slabs. When sheets or rolls overlap, they shall overlap at least six inches (6").

T. ADA Detectable Warning Surface: Precast or prefabricated paving units or detectable Warning plate with a non-slip texture on the travel surface. Color shall be a shade of brick red. There shall be a minimum of 70 percent contrast in light

reflectance between the detectable warning surface and the adjoining surfaces. Material used to provide visual warning shall be an integral part of the detectable warning surface. Visual contrast to meet the existing ADAAG A4.2.9.2.

1. Detectable Warning Plate Model R-4984 by Neenah Foundry, 2121 Brooks Avenue, Neenah, WI 54956, (800) 558-5075, www.nfco.com.
2. ADA Pavers by Whiteacre-Greer, 1400 S. Mahoning Avenue, Alliance, OH 44601, (800) 947-2837, www.wgpaver.com.
3. Detectable Warning Surface System by Detecto-Tile, 10133 State Highway 7, Worcester, NY 12197, (607) 397-9381, www.detectotile.com.
4. Classic Dot Detectable Warning Pavers by Oaks Concrete Products, 1900 Vulcan Blvd., Bartlett, IL 60103, (800) 263-4162, www.oakspavers.com.
5. Granite Truncated Dome Pavers by Cold Spring Granite Company, 202 S. Third Avenue, Cold Spring, MN 56320-2593, (800) 551-7502, www.coldspringgranite.com.

2.02 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. The curing surfaces shall remain uncovered for at least four days, after which time new and unwrinkled, non-staining reinforced kraft curing paper may be used for additional protection. Moisture Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not use items of aluminum for mixing, chuting, conveying, forming, or finishing concrete. However, magnesium alloy tools may be used for finishing.
- E. Subbase shall be cleaned of all the vegetation, pavement, obstructions and compacted as specified in the specifications.

3.01 METHOD

- A. Set forms true to line and grade and anchor rigidly in position.
- B. Place broken stone compacted to minimum depth of 6" level and grade to the required elevation below the concrete surface.
- C. All heavy-duty concrete pads shall be reinforced with 6" x 6" welded wire mesh at 2" below the surface.
- D. Concrete sidewalk surface shall have medium broom finish perpendicular to line of walk with dummy scoring joints as shown on the plans and/or 5' x 5' panel and as directed by RIOC's Representative.

- E. Space expansion joints equally at not more than 50'-0" on center unless otherwise indicated. Place expansion joints to isolate sidewalk from other structures and fixed objects.
- F. Place joint filler at expansion joints and where new concrete abuts existing concrete paving and fixed structures or appurtenances. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed.
- G. The scoring shall be tooled scored.
- H. Sidewalk expansion joints shall be spaced at 20 feet aligned with curb joint. The joints will be 3/8" wide having preformed joint filler sealed with asphaltic blown joint filler.
- I. Pedestrian ramps shall be constructed strictly in compliance with latest N.Y.C.D.O.T. standards (at the time of bidding) and requirements. No deviation shall be allowed until and unless permitted by Construction Manager.

3.03 PLACING REINFORCEMENT (Amendments to ACI 301, Section 3):

- A. At the time concrete is placed, reinforcement shall be free of mud, oil, loose rust, loose mill scale, and other materials or coatings that may adversely affect or reduce the bond.
- B. Unless otherwise shown differently on the Drawings, all reinforcement to be placed per ACI 301-16.

3.04 PLACING CONCRETE

- A. Consolidate concrete by spading, rodding, forking, or using an approved vibrator eliminating all air pockets, stone pockets, and honeycombing. Work and float concrete surface so as to produce a uniform texture.
- B. Locate construction joints per drawings.

3.05 PLACING ADA DETECTABLE WARNING SURFACE

- A. The ADA detectable warning surface shall be installed behind the edge of the curb.
- B. Domes shall be aligned on a square grid in the predominant direction of travel to permit wheels to roll between the domes.
- C. Install in accordance with the manufacturer's printed instructions.
- D. The curb, ADA detectable warning surface, and sidewalk shall be flush with the elevation of the road surface.

3.06 FINISHING AND CURING

- A. Wait until bleeding is stopped before final finishing operations.

- B. Keep surface damp but not wet between initial strike off and final finish.
 - 1. Utilize a fog spray, evaporative inhibitor, or midrange water reducer that is compatible with supplementary cementing materials to help control the amount of surface drying of the fresh concrete.
- C. Use minimal working of the surface during finishing.
- D. Utilize a magnesium or wood float.
- E. Avoid the use of steel finishing trowels and utilize a concrete finishing machine when possible.
- F. Finish edges of walk and expansion and control joints with a 1/4 inch radius edging tool.
- G. Provide broom finish for walk surfaces.
- H. Apply curing and anti-spalling compound in accordance with the manufacturer's printed instructions.
- I. Apply curing immediately after final finish.
- J. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.
- K. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.
- L. Saw control joints (CJ) one inch deep after the concrete has set. Complete sawcuts within 18 hours after slab is placed. Space control joints equally between expansion joints at approximately 5'-0" on center, except where a different spacing is shown on the drawings.
- M. Provide tooled control joints one inch deep. Space control joints equally between expansion joints approximately 5'-0" on center, except where a different spacing is shown on the drawings.

END OF SECTION

SECTION 32 13 73

JOINT FILLER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Sealant for concrete sidewalks, pigmented and unpigmented, as shown on the plan in accordance with specifications.

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each product specified except miscellaneous materials.

1.02 RELATED SECTIONS

- A. Related work is described in the following sections of the specifications

Section 32 13 00. - Concrete Pavement
Section 32 16 13 - Concrete Curbs

1.03 QUALITY ASSURANCE

- A. Container Labels: Include manufacturer's name, trade name of product, kind of material, federal specification number (if applicable), expiration date (if applicable) and packaging date or batch number.

1.04 PROJECT CONDITIONS

- A. Environmental Conditions:
 - 1. Temperature: Unless otherwise approved or recommended in writing by the sealant manufacturer, do not install sealants at temperatures below 40 degrees F or above 85 degrees F.
 - 2. Humidity and Moisture: Do not install the Work under this Section under conditions that are detrimental to the application, curing and performance of the specified materials.
- B. Protection:
 - 1. Protect all surfaces adjacent to sealants with non-staining removable tape or other approved covering to prevent soiling or staining.

PART 2 PRODUCTS

2.01 SEALANTS

- A. Type 1B Sealant:
 - 1. For Horizontal Joints: One-part, self-leveling silicone or polyurethane sealant for traffic bearing construction; Bostik Chem-Calk 955-SL, Tremco Vulkem 45, Pecora Urexpan NR-201, Pecora 300-SL, Pecora 310-SL, Sika Sikaflex-1CSL, Dow Corning CCS.
 - 2. For Vertical Joints: One-part, non-sag silicone or polyurethane sealant; Tremco Vulkem 116, Pecora Dynatrol I, Sika Sikaflex Textured Sealant, Dow Corning CCS or CWS, Pecora 301-NS, Pecora 311-NS.

2.02 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer/Conditioner: As recommended by the sealant manufacturer for the particular joint surface materials and conditions.
- B. Backer Rod: Compressible rod stock or expanded, extruded polyethylene.
- C. Bond Breaker Tape: Polyethylene or other plastic tape as recommended by the sealant manufacturer; non-bonding to sealant.
- D. Cleaning Solvents: Oil free solvents as recommended by the sealant manufacturer. Do not use re-claimed solvents.
- E. Masking Tape: Removable paper or fiber tape, self-adhesive, non-staining.

2.03 COLOR OF MATERIALS

- A. For concealed materials, provide the natural color which has the best overall performance characteristics.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean joint surfaces immediately before installation of sealant and other materials specified in this Section.
 - 1. Remove all loose materials, dirt, dust, rust, oils and other foreign matter that will impair the performance of materials installed under this Section. When necessary or when directed, wire brush, grind, or acid etch to thoroughly clean joint surfaces.

3.02 JOINT FILLER INSTALLATION

- A. Set joint fillers at proper depth and position as required for installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.
 - 1. Smooth Edged Joints: For joints between two concrete slabs or where new concrete abuts smooth edged materials use either filler as specified.
 - 2. Irregular Edged Joints: For joints where new concrete abuts granite curbs or other irregular edges use closed cell polyurethane joint filler.

3.03 BACKER ROD AND BOND BREAKER TAPE INSTALLATION

- A. Install bond breaker tape in relaxed condition as it comes off the roll. Do not stretch the tape. Lap individual lengths.

- B. Provide backer rod of sufficient size to fill the joint width at all points in a compressed state. Compress backer rod at the widest part of the joint by a minimum of 25 percent. Do not cut or puncture the surface skin of the rod.

3.04 SEALANT INSTALLATION

- A. Except as shown or specified otherwise, install sealants in accordance with the manufacturer's printed instructions.
 - B. Prime joint surfaces which are to receive Type 1A Sealant. Do not allow the primer to spill or migrate onto adjoining surfaces.
 - C. Apply sealant with ratchet hand gun or other approved mechanical gun. Where gun application is impractical, apply sealant by knife or by pouring as applicable.
 - D. Finishing: Tool all vertical, non-sag sealants so as to compress the sealant and eliminate air voids. Provide a neat smoothly finished joint with a slightly concave surface unless otherwise indicated or recommended by the manufacturer.
1. Use tool wetting agents as recommended by the sealant manufacturer.

3.05 CLEANING

- A. Immediately remove misapplied sealant and drippings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.
- B. After sealants are applied and before skin begins to form on sealant, remove all masking and other protection and clean up any remaining defacement caused by the Work.

END OF SECTION

SECTION 32 16 13

CONCRETE CURBS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Construct concrete curbs and anchors as shown on the plan in accordance with N.Y.C.D.O.T. Standard Specifications.

1.03 RELATED SECTIONS

- A. Related work is described in the following sections of the specifications:

Section 31 23 00 - Earthwork, Unclassified Excavation

Section 31 23 33 - Excavation, Backfill and Compaction for Utility Trenches

Section 32 13 13 - Concrete Pavement

Section 32 13 73 – Joint Filler

1.03 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of American Concrete Institute (ACI) and American Society for Testing and Materials (ASTM) documents.
 - 1. ACI 304.2R-96: Placing Concrete by Pumping Methods.
 - 2. ACI 305R-10: Hot Weather Concreting.
 - 3. ACI 306R-10: Cold Weather Concreting.
 - 4. ACI 308.1-11: Standard Specification for Curing Concrete.
 - 5. ASTM C 94/C 94M – 11b: Standard Specification for Ready-Mixed Concrete.
 - 6. ASTM C 494/C 494M - 11: Standard Specification for Chemical Admixtures for Concrete.

1.04 DEFINITIONS

- A. ACI 301, Section 1.2 - Definitions:
 - 1. Add the following definitions:
 - a. Cementitious Material: Cementitious materials include cement, ground blast furnace slag and fly ash.
 - b. Corrosion Inhibitor Admixture: A liquid admixture, calcium nitrite that inhibits corrosion of concrete-embedded steel in the presence of chloride ions.
 - c. Pumped Concrete: Concrete that is conveyed by pumping pressure through rigid pipe or flexible hose.
 - d. Water-to-Cementitious Ratio (w/c): An ratio representing quantity in pounds of free moisture available for cement hydration divided by quantity of cementitious materials in pounds per cubic yard concrete.

1.05 SUBMITTALS

- A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.
- B. Product Data:
 - 1. Mix Design: Submit proposed concrete design mix(es) together with name and location of batching plant at least 28 days prior to the start of concrete work.
 - a. Include test results of proposed concrete proportions based on previous field experience or laboratory trial batches in accordance with ACI 301, Section 4.
 - b. Pumped Concrete: Include test results of proposed design mix(es) tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.
 - 2. Portland Cement: Brand and manufacturer's name.
 - 3. Fly Ash: Name and location of source, and DOT test numbers.
 - 4. Air-entraining Admixture: Brand and manufacturer's name.

1.06 QUALITY ASSURANCE

- A. Qualifications of Crew Pumping Concrete: Workers pumping concrete shall have had at least one year of experience pumping concrete.
- B. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.
- C. Truck mixers for concrete shall be currently approved by the New York State Department of Transportation.
- D. Pumping equipment for pumped concrete shall be subject to the approval of RIOC.
- E. Fly ash supplier shall be on the New York State Department of Transportation's current "Approved List of Suppliers of Fly Ash".
- F. Source Quality Control: RIOC reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:
 - 1. Batching and mixing facilities and equipment.
 - 2. Sources of materials.
- G. ACI 301, Section 1.3 Reference standards and cited publications:
 - 1. Add the following to the list of ASTM Standards:
 - a. C 311-77 Standard Methods of Sampling and Testing Fly Ash or Natural Pozzolans For Use As A Mineral Admixture in Portland Cement Concrete.
- H. Performance Criteria: The following criteria are required for the products included in this section:
 - 1. Cast-in-place Concrete shall contain post-industrial and/or post-consumer recycled content as follows:
 - a. Fly Ash: Concrete shall incorporate fly ash as a replacement for 15 percent (by weight) of the Portland

- cement. All design mixes are subject to review and approval by RIOC.
 - b. GGBF (Ground Granulated Blast Furnace) Slag: Concrete shall incorporate GGBF slag as a replacement for at least 20 percent (by weight) of the Portland cement. All design mixes are subject to review and approval by RIOC.
 - c. Certification of recycled content shall be in accordance with the SUBMITTALS Article above.
- 2. Concrete manufactured within 500 miles (by air) of the project site shall be documented in accordance with the SUBMITTALS Article above.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C 150, Type I or II Portland cement.
- B. Water: Potable.
- C. Air-entraining Admixture: ASTM C 260, and on the New York State Department of Transportation's current "Approved List".
- D. Joint Filler: As specified in Section 321373.
- E. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C 171.
- F. Fly Ash: ASTM C 618, including Table 1 (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.
- G. Ground Granulated Slag: ASTM C 989, Grade 100 or 120.
- H. Fibrous Concrete Reinforcing: 100% polypropylene, ASTM C 1116.

2.02 PROPORTIONING OF MIXES

- A. Cast-in-place concrete shall be air-entrained normal weight concrete.
 - 1. Normal weight concrete shall have a minimum compressive strength of 5000 psi, with a minimum of 658 pounds of cement per cubic yard. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site. Make necessary adjustments to the design mix to compensate for the use of fly ash and slag as a partial replacement for (Portland) cement.
 - a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.
 - b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.
- B. Design Air Content: Design air content for concrete shall be 6 percent by volume, with an allowable tolerance of plus or minus 1.5 percent for total air

content, except as otherwise specified. Use air-entraining admixture, not air-entrained cement.

- C. Water-Cement Ratio: Cast-in-place concrete shall have a maximum water-cement ratio of 0.45.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Use fiber mesh concrete unless otherwise noted.
- B. Set approved forms true to line and grade. Cast curb in 10 foot long sections. If curbs will abut existing pavement, locate construction joints opposite existing pavement joints as directed.
- C. Provide cut to size joint filler between 10 foot sections and where curb abuts existing concrete paving and fixed structures or appurtenances. The joints between segments are not to exceed 1/4" in width. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed.
- D. Consolidate concrete by spading, rodding, forking, or using an approved vibrator eliminating all air pockets, stone pockets, and honeycombing. Remove forms and rub exposed face of curb to a smooth rubbed finish. The forms are to be left in place until the concrete has hardened sufficiently to permit removal without damage to the curb. No plastering will be permitted.

3.02 JOINTS

- A. General: Construct control joints and construction joints true-to-line with face perpendicular to surface of the concrete, unless otherwise indicated.
- B. Control Joints: Provide control joints, sectioning concrete into areas as shown on the drawings or every ten linear feet for curbs. Construct control joints for a depth equal to at least 1/4 of the concrete thickness.
- C. Sawed Joints: Form control joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded or otherwise damaged by cutting action.
- D. Construction Joints: Place construction joints at end of all pours and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such pours terminate at expansion joints.

3.03 CURING AND PROTECTION

- A. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.
- B. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as

uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.

C. Cover and cure for a minimum of seven days in accordance with ACI 301.

3.04 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete, as directed by RIOC's Representative.

END OF SECTION

SECTION 32 17 13

PRECAST CONCRETE PARKING BUMPERS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog cuts, specifications, and installation instructions for precast bumpers.
- B. Quality Control Submittals:
 - 1. Test Reports: Random freeze thaw tests shall be conducted by the manufacturer. Test specimens shall retain 60 percent of its initial modulus of elasticity after 300 cycles. Furnish test results to RIOC upon request.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Precast Concrete: Normal weight, 5000 psi, air entrained concrete. Air content shall be 6 percent by volume within an allowable tolerance of plus or minus 1.5 percent.
- B. Bar Reinforcement: ASTM A 615, Grade 40, deformed.
- C. Setting Pins: 3/4 x 18 inches galvanized steel.

2.02 FABRICATION

- A. Parking bumpers shall be cast at the manufacturer's plant, not at the job site. Castings shall have plane smooth surfaces, true to line and face, free from defects and sharp arises. Overall dimensions for castings shall not vary more than 1/16 inch from those indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Center each unit between parking bay lines.
- B. Anchor each parking bumper with two setting pins driven through precast or drilled holes into the subgrade or pavement below.

3.02 FIELD QUALITY CONTROL

- A. RIOC may conduct additional tests. Replace units taken for testing, not to exceed 10 linear feet for each 1000 feet or fraction thereof delivered to the project.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Samples:
 - 1. Paint: One pint, each type. Include the manufacturer's label with product analysis.
- B. Quality Control Submittals:
 - 1. Certificates: Affidavit required under Quality Assurance Article.

1.02 QUALITY ASSURANCE

- A. Certification: Affidavit by the paint applicator, certifying that the materials comply with the current regulatory requirements in effect at the time products were delivered and applied.

1.03 PROJECT CONDITIONS

- A. Perform the painting operations after working hours, on weekends or at such time so as not to interfere with the flow of traffic. Provide temporary barriers to prevent vehicles from driving over newly painted areas.
- B. Apply paint on dry pavement surface, when the air temperature is above 40 degrees F.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Paint: DOT Section 640-2, yellow or white as indicated, or if not indicated as directed. Delete reference to Glass Beads.
- B. Rapid Dry Paint:
 - 1. Aexcel Corp., www.aexcelcorp.com, 72W-A042 White, 72Y-A082 Yellow
 - 2. Sherwin-Williams, www.swpavementmarkings.com, TM2196 White, TM2197 Yellow
 - 3. Franklin Paint Company, In a density of 80 to 85 percent of the maximum density as determined by the method D of ASTM D 698c., www.franklinpaint.com, 2014 White, 2015 Yellow.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove dust, dirt, and other foreign material detrimental to paint adhesion.
- B. Mark layout of stripes and lines with chalk or paint.

3.02 APPLYING PAVEMENT MARKING

- A. Apply paint in accordance with DOT Section 640-3.02, except as follows:
 - 1. Delete references to Glass Beads.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCE AND GATES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Construct concrete curbs and anchors as shown on the plan in accordance with N.Y.C.D.O.T. Standard Specifications.

1.03 RELATED SECTIONS

- A. Related work is described in the following sections of the specifications:
Section 31 23 00 - Earthwork, Unclassified Excavation

1.03 REFERENCES

- A. Comply with ASTM A 53 for requirements of Schedule 40 piping.
- B. Welding Standards: "Structural Welding Code - Steel, AWS D1.1" or "Structural Welding Code - Sheet Steel, AWS D1.3", as applicable, by the American Welding Society (AWS Codes).
- C. Materials and Finishes Standard: ANSI/BHMA A156.18-1993, "American National Standard for Materials and Finishes".

1.03 DEFINITIONS

- A. Height of Fence: Distance measured from the top of concrete footing to the top of fabric.

1.04 SUBMITTALS

- A. Shop Drawings: Complete detailed drawings for each height and style of fence and gate required. Include separate schedule for each listing all materials required and technical data such as size, weight, and finish, to ensure conformance to specifications.
- B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions for each item specified.
- C. Samples:
 - 1. Fence Fabric: Minimum one square foot.
 - 2. Fence and Gate Posts: One foot long each.
 - 3. Miscellaneous Materials and Accessories: One each.
 - 4. If directed, provide samples from materials delivered to the Site for installation.

1.05 QUALITY ASSURANCE

- A. Comply with standards of the Chain Link Fence Manufacturer's Institute.
- B. Provide steel fence and related gates as a complete compatible system including necessary erection accessories, fittings, and fastenings.
- C. Posts and rails shall be continuous without splices.
- D. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Class B Steel Tubing (Option):
 - 1. SS-40 Fence Pipe by Allied Tube & Conduit Corp.
 - 2. WT-40 Fence Pipe by Wheatland Tube Company.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.02 STEEL FRAMEWORK (FOR FENCES UP TO 6'-0" HIGH)

- A. End Posts, Corner Posts and Pull Posts:
 - 1. Pipe: 2.375 inches OD, 3.65 pounds per linear foot (Schedule 40).
 - 2. Class B Steel Tubing: 2.375 inches OD, 3.11 pounds per linear foot.
 - 3. Square Tubing: 2 inches OD, 3.60 pounds per linear foot.
- B. Line Posts:
 - 1. Pipe: 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).
 - 2. Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.

2.06 STEEL FABRIC

- A. One-piece widths for fence heights up to 12'-0".
- B. Chain link, 2 inch mesh, No. 9 gauge; 3/8 inch mesh, No. 11 gauge.
- C. Selvages: Top edge and bottom edge knuckled.

2.07 SWING GATE POSTS

- A. Single width of gate 4'-0" wide:
 - 1. Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).
 - 2. Class B Steel Tubing: 2.875 inches OD, 4.64 pounds per linear foot.
 - 3. Square Tubing: 2.50 inches OD, 5.70 pounds per linear foot.

2.08 SWING GATE FRAMES

- A. 4'-0" Double Gate.
 - 1. Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).
 - 2. Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.
 - 3. Square Tubing: 1.50 inches OD, 1.90 pounds per linear foot.
- B. Assemble gate frames by welding or with special steel fittings and rivets for rigid connections. Install mid-height horizontal rails on gates over 10 feet high. When width of gate leaf exceeds 10 feet, install mid-distance vertical bracing of the same size and weight as frame members. When either horizontal or vertical bracing is not required, provide truss rods as cross bracing to prevent sag or twist.

2.10 SWING GATE HARDWARE

- A. Gates:
 - 1. Hinges: Designed to permit 180-degree gate hinge item no. 014005 or appropriate for use by Hearne Steel Company, Inc.
 - 2. Lock and Gate stop: Tube gate anchor type complete with flush plate set in concrete. Padlock eye shall be an integral part of latch construction.

2.12 FABRICATION AND MANUFACTURE

- A. Thoroughly clean all steel prior to sending it to the galvanizer the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning". Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", SSPC SP-6 "Commercial Blast Clean" or SSPC SP-7 "Brush-Off Blast Cleaning".
 - 1. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

2.13 VINYL COATING

- A. All framing, posts, rails, braces, fittings and accessories shall meet thickness and gauge requirements **before** vinyl coating and shall be resin clad with either an epoxy modified polyvinyl chloride or a thermoplastic polyester resin with a minimum thickness of 7 mils and shall be of the same color as the fence fabric.
- B. All fabric shall meet thickness and gauge requirements **before** vinyl coating and shall be resin clad with either an epoxy modified polyvinyl chloride or a thermoplastic polyester resin with a minimum thickness of 10 mils.
 - B. Colors shall be stabilized, and have a light fastness to withstand a minimum Weather-O-Meter exposure of 1500 hours without any deterioration when tested in accordance with ASTM D 1499.
- C. Vinyl coating shall be chemically bonded to heated pipe, fittings, etc., or they shall be clad with a heavy molecule, saturated, linear thermoplastic polyester resin applied by electrostatic sprays and fusing or equal method. Each length of pipe shall be sealed with two polyethylene plugs to prevent internal corrosion.

- D. Vinyl coating shall be continuously bonded to the wire under 5000 psi pressure before the wire is woven into fabric.

2.14 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Rails and Post Braces:
 - 1. Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).
 - 2. Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.
- B. Fittings and Post Tops: Steel, wrought iron, or malleable iron.
 - 1. Fasteners: Tamper-resistant cadmium plated steel screws.
- C. Stretcher Bars: One piece equal to full height of fabric, minimum cross-section 3/16 inch by 3/4 inch.
- D. Metal Bands (for securing stretcher bars): Steel, wrought iron, or malleable iron.
- E. Wire Ties: Conform to American Steel Wire gauges.
 - 1. For tying fabric to line posts, rails and braces: 9 gauge (.1483 inch) steel wire.
 - 2. For splicing overlapped fabric at bottom rail: 11 gauge (.1205 inch) steel hog rings.
- F. Truss Rods: 3/8-inch diameter.
- G. Concrete: Portland Cement concrete having a minimum compressive strength of 4000 psi at 28 days.
- H. Spiral Paper Tubes:
 - 1. Sonotube by Sonoco Products Co., North Second St., Hartsville, SC 29550, (800) 377-2692.
 - 2. Slek/tubes by Jefferson Smurfit Corp., P.O. Box 66820, St. Louis, MO 63166, (314) 746-1100.
- I. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film, and meeting the requirements of DOD-P-21035A (NAVY).
- J. Tension Wire: 7 gauge coiled spring steel wire.
- H. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
 - 1. Embeco 636 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 227-3350.
 - 2. Ferrolith G-NC by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.
 - 3. Ferro-Grout by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NE 68152, (800) 362-3331.
 - 4. Vibra-Foil by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not begin installation of any fencing until finished grading has been completed.
- B. Clear and grub along fence line as required to eliminate growth interfering with alignment. Remove debris from State property.

3.02 INSTALLATION

- A. Space posts equidistant in the fence line with a maximum of 10 feet on center. For fences 16 feet and higher space posts a maximum of 8 feet on center.
- B. Setting Posts in Earth: Drill holes for post footings Set posts in center of hole and fill hole with concrete. Plumb and align posts. Vibrate or tamp concrete for consolidation. Finish concrete in a dome shape above finish grade elevation to shed water. Do not attach fabric to posts until concrete has cured a minimum of 7 days.
- C. Brace assembled sections until permanently secured in place to prevent displacement or distortion of the members. Do not utilize metal bracing to support post when plumbing or securing posts.
- E. If post tops or extension arms will not be installed prior to impending rain, provide temporary covers over tops of posts to prevent posts from filling with water.
- F. Locate corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend the line posts.
- G. Install top rail continuously through post tops or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by fencing manufacturers.
- H. Install bottom rail in one piece between posts and flush with post on fabric side using special offset fittings where necessary.
- I. Brace corner posts, pull posts, end posts, and gate posts to adjacent line posts with horizontal rails.
- J. Diagonally brace corner posts, pull posts, end posts, and gate posts to adjacent line posts with truss rods and truss rod tighteners.
- K. Attach fabric to security side of fence. Maintain a 2-inch clearance above finished grade except when indicated otherwise. Thread stretcher bars through fabric using one bar for each gate and end post and 2 for each corner and pull post. Pull fabric tight so that the maximum deflection of fabric is 2 inches when a 30-pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced 15 inches oc. Fasten fabric to steel framework with wire ties spaced 12 inches oc for line posts and 24 inches oc for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties, and other fasteners securely.

- L. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of fence. Tighten nuts and cut off excess threads so no more than 1/8 inch is exposed. Peen ends of all bolts below a height of 10 feet to prevent loosening or removal of nuts.
 - 1. Secure post tops and extension arms with tamper-resistant screws.
- M. Install gates plumb and level and adjust for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

3.03 ADJUSTING

- A. Adjust operative units and equipment to work freely and easily, ready for use. Field lubricate operating and locking systems in accordance with the manufacturer's maintenance instructions. Adjust equipment when the temperature is approximately 70 degrees F.

END OF SECTION

SECTION 32 91 20

TOPSOIL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 – General Requirements, apply to this Section.

1.02 DESCRIPTION

- A. The Contractor shall furnish and place Topsoil for Planting Beds and Seeded areas obtained from outside the site of the work, to bring the site to the required lines and grades indicated on the drawings.

1.03 SECTION INCLUDES

- A. Topsoil for Planting Beds
- B. Bridging soil layer

1.04 SUBMITTALS

- A. Documented Material Sample & Test Report: Two (2) five (5) pound bag Samples, gradation tests, material content tests, and compaction tests of each material to be used as topsoil with a report from an approved independent testing laboratory including sieve analysis, organic content, electrical conductivity, pH, hydrometer test, and N, P,K levels, shall be submitted to the LANDSCAPE ARCHITECT ten (10) days prior to commencing topsoil placement operations for the approval. Laboratory testing performed more than six (6) months prior to the Contractor's submittal date will be rejected. By submitting samples of this material, the Contractor agrees and guarantees that the topsoil material used for construction will conform to the samples supplied. Final acceptance of topsoil material rests with the LANDSCAPE ARCHITECT, whose decision shall be final and binding upon the Contractor. However, the acceptance of any material by the LANDSCAPE ARCHITECT shall not relieve the Contractor of their responsibility that the topsoil material used conforms with approved samples and the specifications. A Notarized certificate identifying source of soil shall be secured to each sample submitted to the LANDSCAPE ARCHITECT.
- B. Environmental Test Results: The Contractor shall submit prior to transporting to the site, all environmental test results for approval.

1.02 QUALITY ASSURANCE

- A. Topsoil used on this project shall be tested and approved before placement.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Source: Provide topsoil from areas from which no topsoil has been taken previously and from areas which are producing or have produced fair to good yield farm crops without unusual fertilization for a minimum period of 10 years, or from arable or cultivable areas supplied with good normal drainage.
- B. Provide topsoil conforming to the following:
1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
 2. Containing not less than 4 percent nor more than 20 percent organic matter in that portion of a sample passing a 1/4 inch sieve when determined by the wet combustion method on a sample dried at 105 degrees C.
 3. Containing a Ph value within the range of 4.5 to 7 on that portion of the sample which passes a 1/4 inch sieve.
 4. Containing the following gradations:

SIEVE DESIGNATION	PERCENT PASSING
1 inch	100
1/4 inch	97 - 100
No. 200	20 - 65 (of the 1/4-inch sieve)

2.02 BRIDGING SOIL LAYER

- A. Where soils are to be placed on existing subgrade, the contractor shall decompact the existing subgrade to a minimum of 6". Decompacked soil shall be mixed with proposed soil to form a 50-50 soil mix as a bridging layer. The amended soil shall be placed to top of subgrade depth. No drainage geotextile shall be used between layers.

2.03 LIMESTONE

- A. Provide ground limestone in the producer's standard bags containing not less than 90 percent of calcium and magnesium carbonates equivalent to not less than 45 percent of the mixed oxides of calcium and magnesium and conforming to the following gradations:

SIEVE DESIGNATION	PERCENT PASSING
No. 100	50 - 100
No. 20	100

PART 3 EXECUTION

3.01 PREPARATION

- A. Grub out and remove all vegetation in the area of the approved topsoil source.

3.02 SPREADING TOPSOIL

- A. Perform topsoil spreading operations only during dry weather.

- B. To ensure a proper bond with the topsoil, harrow or otherwise loosen the subgrade to a depth of 6 inches before spreading topsoil.
- C. Spread topsoil directly upon prepared subgrade to a minimum depth measuring 4 inches after natural settlement in areas to be seeded. Smooth out unsightly variations, bumps, ridges, and depressions which will hold water. Remove stones, litter, or other objectionable material. Finished surfaces shall conform to the contour lines and elevations indicated on the drawings or fixed by RIOC's Representative.

3.03 SPREADING LIMESTONE

- A. Spread ground limestone evenly over the topsoiled surface. Incorporate limestone within the top 2 inches of soil prior to finish raking.
- B. Apply limestone at the following rate per 1000 sq ft of topsoil area, corresponding to the hydrogen ion concentration (Ph) shown by the soil chemical analysis:

PH	RATE (pounds)
4.5 to 5.0	150
5.0 to 5.5	100
5.5 to 6.0	50
6.0 to 6.8	25
over 6.8	0

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Application of lawn seed mix and erosion control including one year maintenance.
- B. Application of Rain garden seed mix, rain garden cover crop, and erosion control including one year maintenance.

1.02 SUBMITTALS

- A. Product Data; Hydro Mulch: Manufacturer's specifications and application rate.
- B. Product Data; Erosion Control Blanket: Manufacturer's specifications.
- C. Sample: One pound of seed each seed mix in vendor's unopened package with label and seed analysis.

1.03 QUALITY ASSURANCE

- A. Field Examples: Seed samples will be taken by RIOC's Representative 30 days before sowing and sent to the New York State Seed Testing Laboratory, 6 Harriman Campus Road, Albany, NY 12206 for testing. Test analysis will indicate species, purity, percent of germination, and weed content. Results will be sent directly to RIOC's Representative for acceptance or rejection based on these tests. Pay all expenses incurred for testing.

1.04 DELIVERY STORAGE AND HANDLING

- A. Deliver fertilizer in manufacturer's standard size bags or cartons showing weight, analysis, and the name of the manufacturer. Store as approved by RIOC's Representative.
- B. Store all seed at the site in a cool dry place as approved by RIOC's Representative. Replace any seed damaged during storage.

1.05 SCHEDULING

- A. Time For Seeding: Optimum period to sow permanent grass seed is generally between April 1st and May 15th or between August 15th and October 1st. Schedule application for when weather conditions permit or as Directed.
 - 1. Provide temporary seed and mulch when final grading is complete while waiting for optimal seeding period.
 - 2. Provide temporary seed and mulch for temporary cover on disturbed ground not to be worked on for more than 7 days.
 - 3. Provide temporary seed and mulch on disturbed earth prior to temporary shutdown of construction.

PART 2 PRODUCTS

2.01 FERTILIZER

- A. Fertilizer: Mixed commercial fertilizers shall contain total nitrogen, available phosphoric acid and soluble potash in the ratio of 10-6-4 (50% N/UF). 50% of total nitrogen shall be derived from ureaform furnishing a minimum of 3.5% water insoluble nitrogen (3.5% WIN). The balance of the nitrogen shall be present as methylene urea, water soluble urea, nitrate and ammoniacal compounds.
- B. Other fertilizers meeting DOT Specification Section 713-03 Fertilizer can be used.

2.02 SEED

- A. Furnish fresh, clean, new-crop seed mixed in the proportions specified for species and variety and conforming to Federal and State Standards.
- B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.1 percent by weight.
- C. All seed will be rejected if the label or test analysis indicates any of the following contaminates: Timothy, Orchard Grass, Sheep Fescue, Meadow Fescue, Canada Blue Grass, Alta Fescue, Kentucky 31 Fescue, and Bent Grass.
- D. Provide the following seed mixture:

A = Min. Percentage of Germination

B = Min. Purity Percentage

C = Weight Pure Live Seed in Mixture

LAWN SEED MIX

Name	Variety	A	B	C
Chewings Fescue (Festuca rubra commutata)	Banner, Highlight, Jamestown, or an approved equal.	85	97	25
Kentucky Bluegrass *	Barron, Flying, Glade, or an approved equal.	80	95	55
Perennial Ryegrass ** (Lolium perenne)	Manhattan II, Pennfine, Yorktown II, or an approved equal.	90	98	20

RAIN GARDEN SEED MIX

Item Number ERNMX-180 as produced by ERNST Seeds, Meadville, PA phone: 800-873-3321.

Name	Variety	MIX %
Schizachyrium scoparium, Little Bluestem,	'Itasca', MN Ecotype or an approved equal.	33.4
Elymus virginicus,	Madison-NY Ecotype, or an approved	20.0%

Name	Variety	MIX %
Virginia Wildrye	equal.	
Carex vulpinoidea, Fox Sedge	PA Ecotype, or an approved equal.	7.0%
Chasmanthium latifolium, River Oats	WV Ecotype, or an approved equal.	5.6%
Echinacea purpurea Purple Coneflower	Purple Coneflower or an approved equal.	5.5%
Chamaecrista fasciculata Partridge Pea	PA Ecotype, or an approved equal.	3.0%
Coreopsis lanceolata Lanceleaf Coreopsis	Lanceleaf Coreopsis or an approved equal.	3.0%
Panicum clandestinum, Deertongue	Tioga or an approved equal.	3.0%
Panicum rigidulum, Redtop Panicgrass,	PA Ecotype, or an approved equal	3.0%
Verbena hastata, Blue Vervain	PA Ecotype, or an approved equal	3.0%
Heliopsis helianthoides Oxeye Sunflower	PA Ecotype, or an approved equal	2.0%
Asclepias incarnata, Swamp Milkweed	PA Ecotype, or an approved equal	1.8%
Carex scoparia Blunt Broom Sedge	PA Ecotype, or an approved equal	1.0%
Senna hebecarpa Wild Senna	VA & WV Ecotype, or an approved equal	1.0%
Pycnanthemum tenuifolium Narrowleaf Mountainmint	Narrowleaf Mountainmint or an approved equal	0.7%
Aster novae-angliae New England Aster	PA Ecotype, or an approved equal	0.5%
Aster prenanthoides, Zigzag Aster	PA Ecotype, or an approved equal	0.5%
Baptisia australis, Blue False Indigo	Southern WV Ecotype, or an approved equal	0.5%
Zizia aurea Golden Alexanders	Golden Alexanders, or an approved equal	0.5%
Monarda fistulosa, Wild Bergamot	Fort Indiantown Gap-PA Ecotype or an approved equal	0.4%
Helenium autumnale, Common Sneezeweed	PA Ecotype, or an approved equal	0.3%
Juncus tenuis, Path Rush	PA Ecotype, or an approved equal	0.3%
Eupatorium perfoliatum Boneset	PA Ecotype, or an approved equal	0.2%
Juncus effusus (Soft Rush)	Soft Rush, or an approved equal	0.2%

Name	Variety	MIX %
Oenothera fruticosa var. fruticosa (Sundrops)	Sundrops, or an approved equal	0.2%
Solidago nemoralis, PA Ecotype (Gray Goldenrod, PA Ecotype)	PA Ecotype, or an approved equal	0.2%
Solidago rugosa Wrinkleleaf Goldenrod	PA Ecotype, or an approved equal	0.2%

RAIN GARDEN COVER CROP

Item Number SECCER01 as produced by ERNST Seeds, Meadville, PA phone: 800-873-3321.

Name	Variety	MIX %
Secale cereale, Rye	n/a	100%

2.03 MULCH

- A. Dry Application, Straw: Stalks of oats, wheat, rye or other approved crops which are free of noxious weeds. Weight shall be based on a 15 percent moisture content.
- B. Hydro Application: Colored wood cellulose fiber product specifically designed for use as a hydro-mechanical applied mulch. Acceptable Product: Conwed Hydro Mulch, Conwed Fibers, 231 4th Street SW, Hickory, NC.

2.04 EROSION CONTROL

- A. Erosion Control Blanket: All erosion control matting shall be 100% natural, no poly netting shall be used. Erosion control matting shall be used on all seeded areas, regardless of slope. Product shall be single net blanket standard as manufactured by Erosion Control Products, Wabasso, FL. Phone: 863-251-5111. Or an approved equal.
- B. Erosion Control Accessories: erosion control matting shall be held in place by wooden stakes or biodegradable pegs.

PART 3 EXECUTION

3.01 PREPARATION

- A. Seed Bed: Scarify soil to a depth of 3 inches in compacted areas. Smooth out unsightly variations, bumps, ridges, and depressions which will hold water. Remove stones, litter, or other objectionable material.
 - 1. Obtain written approval of seed bed from RIOC's Representative before commencing seeding operations.

3.02 FERTILIZING

- A. Apply 10-6-4 fertilizer evenly at the rate of 40 pounds per 1000 sq ft or 2 pounds of nitrogen per 1000 sq ft.

3.03 SEEDING

- A. Assume all risks when seed is sowed before approval of seed analysis.
- B. Do not seed when the wind velocity exceeds 5 miles per hour.
- C. Cover flush curb inlets with coir log prior to seeding to allow establishment of rain garden root system before receiving stormwater. Remove when vegetation reaches 6", or after one year.
- C. Application Rate:
 - 1. Lawn mix: 5 pounds per 1,000 sq. ft.
 - 2. Rain Garden mix: 0.5 pounds per 1000 sq. ft.
 - 3. Rain Garden cover crop: 0.7 pounds per 1000 sq. ft.
- D. Hydroseeding:
 - 1. Apply seeding materials with an approved hydroseeder.
 - 2. Fill tank with water and agitate while adding seeding materials. Use sufficient fertilizer, mulch, and seed to obtain the specified application rate. Add seed to the tank after the fertilizer and mulch have been added. Maintain constant agitation to keep contents in homogeneous suspension. Prolonged delays in application or agitation that may be injurious to the seed will be the basis of rejection of material remaining in tank.
 - 3. Distribute uniformly a slurry mixture of water, seed, fertilizer, and mulch at a minimum rate of 57 gallons per 1000 sq ft (2500 gallons per acre). RIOC's Representative may order the amount of water increased if distribution of seeding materials is not uniform.

3.04 MULCHING

- A. Dry Application: Within one day after seeding, cover the seeded areas with a uniform blanket of straw mulch at the rate of 100 pounds per 1000 sq ft of seeded area.
- B. Hydro Application: Apply approved mulch in accordance with the manufacturer's written instructions and recommended rates of application.

3.05 EROSION CONTROL

- A. Erosion control matting shall be used on all seeded areas, regardless of slope. Allow for at a minimum of 6in overlapping between adjacent mats
- B. Placement and spacing of stakes or pegs shall be 24 inches on-center or as recommended by the manufacturer.

3.06 LAWN ESTABLISHMENT

- A. Maintain the grass at heights between 3 inches and 3-1/2 inches on a weekly basis until the Final Acceptance of the Work.
- B. Water and protect all seeded areas until final acceptance of the lawn.

3.07 FINAL ACCEPTANCE

- A. Final acceptance of lawn and rain garden areas will be granted when a uniform stand of acceptable grass or rain garden mix is obtained, with a minimum of 95 percent coverage. Portions of the lawn areas may be accepted at various times at the discretion of RIOC's Representative.
- B. Unacceptable lawn areas, hydro application: Reseed, fertilize, and mulch at one-half the specified rate, use full water rate.
- C. At the physical completion of the Work, the State will assume maintenance responsibilities of the lawn areas.

END OF SECTION

SECTION 32 93 01

PLANTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Under these items the Contractor shall furnish landscape plant material as indicated in the Contract Drawings, prepare, plant, water and maintain these areas in accordance with the plans, specifications, and to the satisfaction on the Consultant. This Section includes furnishing and installing the following landscape plants:

1. Trees
2. Grasses
3. Perennials and Groundcover
4. Wood Stakes
5. Horticultural ties
6. Shredded Bark Mulch
7. Mycorrhizal Fungi Inoculant
8. Slow-Release Fertilizer

1.03 RELATED SECTIONS

- A. Related Sections include the following:

Section 01 56 39 Consultant Arborist
Section 32 91 10 – Topsoil

1.02 REFERENCES

- A. Plant Nomenclature: Conform to the latest edition of “Standardized Plant Names” as adopted by the American Joint Committee of Horticultural Nomenclature.
- B. Size and Grading Standards: Conform to the current edition of “American Standard for Nursery Stock” - Sponsor - the American Association of Nurserymen Inc., unless otherwise specified.

1.04 DEFINITIONS

- A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or

shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

- B. Balled and Potted Stock: Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required.
- C. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.
- D. Finish Grade: Elevation of finished surface of planting soil in the planter as shown on the plans.

1.03 SUBMITTALS

- A. List of Plants: Before plant material is shipped to the project site, submit a complete itemized list of all plants including the source of supply.
- B. Product Data: Furnish the following with each planting material delivery.
 - 1. Invoice indicating sizes and variety of plant material.
 - 2. Certificates of inspection required by State and Federal agencies.
 - 3. Labels for each plant or bundles of plants indicating name and size.
- C. Quality Control Submittals:
 - 1. Worker's Qualifications Data: Names and addresses of 5 similar projects that each person has worked on during the past 2 years.

1.04 QUALITY ASSURANCE

- A. Installer's Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants for a minimum of 2 years' experience.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.
- B. Caliper trees up to 4 inches in caliber at a point 6 inches above ground and trees over 4 inches in caliber 12 inches above ground.
- A. Provide quality, size, genus, species, and variety of landscape plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- B. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to

obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

- C. Observation: RIOC's Representative may designate the Landscape Architect to observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. The Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify RIOC's Representative of sources of planting materials seven days in advance of delivery to site.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Notify RIOC's Representative 48 hours in advance of delivery of plant material.
- B. Protect plants against climatic and mechanical injuries.
- C. Deliver fertilizer in manufacturer's standard sized bags showing weight, analysis, and manufacturer's name. Store under a waterproof cover or in a dry place as designated by RIOC's Representative.
- D. Deliver exterior plants freshly dug.
- E. Do not prune trees before delivery, except as approved by the Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
- F. Handle planting stock by root ball.
- G. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.06 PROJECT CONDITIONS

- A. Water will be furnished from existing facilities as directed. Furnish hoses and connections required to adequately water plants.

1.07 COORDINATION

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: Deciduous, woody plants (March 1-May 1), Evergreen (April 1-May 15).
 - 2. Fall Planting: Deciduous, woody plants (October 15-December 1), Evergreen (September 1 - October 15)
 - 3. Native Grasses and Herbaceous Plants: Between April 15-June 15 or September 1 and October 15.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.08 WARRANTY

- A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
 - 1. Warranty Period for Trees, Shrubs, Native Grasses and Herbaceous Plants: One year from date of Substantial Completion.
 - 2. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - 3. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - 4. A limit of one replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.

1.09 MAINTENANCE

- A. Trees, Shrubs, Native Grasses and Herbaceous Plants: Maintain for the following maintenance period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

1. Maintenance Period: 12 months from date of Substantial Completion.

PART 2 PRODUCTS

2.01 TREE, NATIVE GRASS AND HERBACEOUS PLANT MATERIAL

- A. General: Furnish nursery-grown trees, shrubs, native grasses and herbaceous plants complying with ANSI Z60.1, with healthy root and branch systems developed. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement. Buds intact and reasonably closed at time of planting.
- B. Grade: Provide trees, shrubs, native grasses and herbaceous plants of sizes and grades complying with ANSI Z60.1 for type required. Trees, shrubs, native grasses and herbaceous plants of a larger size may be used if acceptable to Consultant, with a proportionate increase in size of roots or balls.
- C. Keep labels on all trees, one shrub, one native grass and one herbaceous plant of each variety and size with a securely attached, waterproof tag bearing legible designation of botanical and common name until Consultant reviews and approves quantity and location.

2.02 SHADE AND FLOWERING TREES

- A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 1. Provide balled and burlapped trees.
 2. Branching Height: One-third to one-half of tree height unless noted otherwise.
 3. Free from frost cracks, broken bark, and dead or broken branches.
 4. Transplanted, or root pruned 360 degrees at least once during the previous 3 years.
- B. Small Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 1. Stem Form: Single stem.
 2. Provide balled and burlapped trees.

3. Free from frost cracks, broken bark, and dead or broken branches.
 4. Transplanted, or root pruned 360 degrees at least once during the previous 3 years.
- C. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
1. Stem Form: Clump as specified in the plant list.
 2. Provide balled and burlapped trees.
 3. Free from frost cracks, broken bark, and dead or broken branches.
 4. Transplanted, or root pruned 360 degrees at least once during the previous 3 years.

2.03 NATIVE GRASSES, AND HERBACEOUS PLANTS

A. Native Grasses and Herbaceous Plants:

1. Provide balled and burlapped or container grown, shrubs and ornamental grasses.

2.03 FERTILIZER

- A. Bonemeal: Commercial, steamed finely ground material containing not less than 1.0 percent nitrogen and 11 percent phosphoric acid.
- B. Commercial Fertilizer (10-6-4): Containing not less than 10 percent nitrogen, 6 percent available phosphoric acid and 4 percent water soluble potash.

2.04 MULCH

- A. Peat Moss: Finely granulated material, passing a 1/2 inch sieve, free of sticks, woody roots, stones and other objectionable material, and of such physical condition that it can be readily incorporated with the topsoil. Furnish material conforming to the following criteria:
1. pH value: 3.0 to 5.0.
 2. Moisture: Not less than 25 percent nor more than 50 percent.
 3. Organic Material: Not less than 47 percent (90 percent dry basis).
- B. Wood Chips: Hardwood or softwood chips produced by a standard wood chipping machine, free of leaves, young green growth, wood shavings,

sawdust, or any foreign material. Chips shall not exceed 3 inches in greatest dimension.

2.04 MYCORRHIZAL FUNGI INNOCULANT

- B. Composition: Pre-measured dry formulation packet such as Mycor Tree Saver Transplant as manufactured by Plant Health Care, Rhizanova Tree Transplant as manufactured by Becker Underwood, Inc. or approved equal.

2.05 MISCELLANEOUS MATERIALS

- A. Wood Stakes: Sound, durable White or Red Cedar, or other approved wood, free of insect or fungus infestation.
- B. Horticultural ties: Model HT-40 shall be Hort Tie by Hort Industries LTD, Bennett, CO. phone: 1-800-643-9547 or approved equal.
- C. Tree Wound Paint: Antiseptic, waterproof, adhesive, elastic tree wound paint containing no kerosene, coal tar, creosote, or other material harmful to cambium or living tissue. As needed per arborists recommendation.

PART 3 EXECUTION

3.01 INSPECTION

- A. Plants to be approved at the nursery by Landscape Architect prior to being shipped to the site.
- B. Do not plant any plant material until after inspection and approval in writing of plant shipments. Secure written approval of any substitutions before planting. Remove rejected material from planting areas.

3.02 PREPARATION

- A. Planting Layout:
 - 1. Stake out tree locations.
 - 2. Obtain layout approval from RIOC's Representative prior to excavations of tree pits and planting beds.
- B. Plant Pit Dimensions: Minimum width 12 inches, measured at the ground surface.
 - 1. Balled and Burlapped:
 - a. Pit Depth: Not to exceed the ball depth.
 - b. Pit Width: Measured at the ground surface, 3 times the width of the ball or as indicated.
- C. Excavation: Excavate pits to the dimensions specified. Dispose of excavated material of the site unless otherwise directed.

3.03 PLANTING

- A. Setting trees:
 - 1. Backfill pits with topsoil and firm to the level upon which trees were previously growing. Set trees plumb. Complete backfilling with topsoil and settle continually with water.
 - 2. Balled Plants: Set plants in position and backfill 1/3 depth of ball. Remove burlap from top and adjust to eliminate air pockets. Complete backfill and settle with water.
- B. Staking: Set tree stakes into solid ground below bottom of tree before backfilling. Place stakes at the outer edge of the roots or ball in line with the prevailing wind at a 10-degree angle from the tree trunk.
- C. Surface Finish: Form saucer as indicated on Drawings or as directed. Grade soil to form a basin on lower side of slope plantings, which will catch and retain water. Top dress basins with fertilizer spread evenly at the rate of 1-1/2 pounds per square yard of plant pit surface. Break saucers and basins before ground freezes.
- D. Mulching:
 - 1. Spread mulch over finished surface of each plant, plant bed and hedge trench in the following amounts:
 - a. Wood Chips: 3 inches.
 - b. Shredded Wood: 2 inches.
 - 2. Water plants thoroughly after mulching.
- E. Pruning: Prune immediately after planting using sharp tools approved by RIOC's Representative. Remove approximately 1/3 of the wood of deciduous plants, maintaining the natural habit of the plant. Cut no leaders. Paint pruning cuts 3 inches in diameter or over with tree wound paint.
- F. Guying: Guy deciduous trees 4 inches and over in caliber; trees over 6 feet high with 3 or more stems; and evergreens 6 feet or over in height, with 3 guys immediately after planting. Attach guys to stakes and trees as indicated. Connect multi-stem trees with protected connecting wires maintaining each stems relationship to one another.
- G. Establishment of Planting: Maintain plantings immediately following planting operations and continue throughout the guarantee period. Establishment of plantings shall consist of keeping plants in healthy, growing conditions by watering, weeding, cultivating, pruning, spraying, tightening of guys, remulching and by any other necessary operations of establishment. Water all plants at least once a week between April 1 and October 31 with approximately 5 gallons per square yard (1 inch layer of water) per watering unless otherwise directed. Provide additional watering during periods of dry weather when required or when directed. Treat plants with good horticultural preventative or remedial measures to control insects, diseases or rodents.

3.04 INSPECTIONS AND REPLACEMENTS

- A. The following inspections apply only to this Section and supersede inspections specified in Section 01 77 16.

1. Physical Completion Inspection and Replacements: Notify RIOC in writing at least ten days prior to requested date of physical completion inspection. Remove and replace dead, unhealthy or badly impaired plants according to the original specification, if so directed. Replace plants during the next planting season if this inspection is not within a planting season.
2. End of Guarantee Inspection and Replacements: Remove stakes, and guy wires at the end of the one year guarantee period unless otherwise directed. Remove and replace dead, unhealthy or impaired plants according to original specification, as directed. Replace plantings during the next planting season if end of guarantee period is not within a planting season.

END OF SECTION

SECTION 33 01 00

MAINTAINING AND PROTECTING EXISTING UTILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1-General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Maintain and protect all existing utilities that are to remain throughout the duration of the project. Coordinate and construct relocated facilities as specified under this section.

1.03 RELATED SECTIONS

Section 31 23 33 – Excavating, Backfilling and Compaction for Pipes and Utility Trenches
Section 32 01 00 – Sawcutting

1.04 SUBMITTALS

- A. Certification: Material certificates of clean trench backfill which shall meet Specification 31 23 23 – Borrowed Fill.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Trench bedding material shall comply with the requirements of respective private utility.
- B. Unless otherwise specified by utility company, trench backfill shall be in accordance with Select Fill/Backfill as specified in Section 31 23 23.

PART 3 - EXECUTION

3.01 METHOD

- A. Utilities, including electric, telephone, gas, cable, sewers, water mains, etc. exist in the project area. The Contractor shall maintain and protect those utilities that are to remain throughout the duration of the project. Any damage done to those facilities belonging to private utility companies shall be repaired by the Contractor at his own expense.
- B. The Contractor shall maintain continuous service to all on-site users of electric, telephone gas, cable, storm and sanitary sewers, and water service throughout construction.
- C. Any relocations of private utilities that may be required for construction the project site shall be done in accordance with the standards and specifications of the Private Utility Companies. The Contractor shall notify the Utility companies well in advance of the intended work.

END OF SECTION

SECTION 33 01 32

TERMINATE AND DEMOLISH EXISTING UTILITIES

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This section describes the Termination and Demolition of Existing Utilities as shown on the plans in accordance with the specifications and the directions of the Owner's Representative. The demolition shall include piping, structures, foundations, and any other related materials encountered.
- B. All existing utilities where encountered that are not proposed for reuse shall be removed within limits of trench excavation, capped, and abandoned in place.
- C. Existing utilities should be out of service before demolition is started.
- D. The Contractor shall obtain the necessary permits and shall notify the Owner one (1) week prior to demolition.

1.03 RELATED WORK

- A. Related work is described in the following sections of the specifications:
Section 31 23 33: Excavating, Backfilling and Compaction for Pipes and Utility Trenches

PART 2. - PRODUCTS

NOT USED

PART 3. - EXECUTION

3.01 METHOD

- A. All work shall be performed in accordance with the plans and requirements of the appropriate city agency or private utility companies.
- B. All material which can be salvaged shall be the property of Owner and shall be disposed of or deposited as per their requirements.

END OF SECTION

SECTION 33 08 10

CLEANING AND DISINFECTING WATER MAINS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Clean and disinfect all installed water mains shown on the plans in accordance with the specifications.

1.03 RELATED SECTIONS

Section 33 11 10 - Cement Lined Ductile Iron Pipe and Fittings for Water Mains
Section 33 12 13 - Wet and Dry Connections to Existing Water Mains

1.04 SUBMITTALS

- A. Certification: Certify in writing that all water mains indicated in Contract Documents will be cleaned and disinfected in accordance with NYCDEP standards and requirements.

PART 2. - PRODUCTS

- A. Disinfecting chemicals shall be as per NYCDEP standards and requirements

PART 3. - EXECUTION

3.01 METHOD

- A. Cleaning and disinfecting water main pipes shall comply with Section 5.02.3 (E) of the NYCDEP Water Main Specifications.
- B. Prior to laying any straight pipe and fittings, the interiors shall be thoroughly flushed with clear water of sufficient volume and pressure from a hose to ensure that removal of all foreign matter that may have been introduced during the storage period. After all visible dirt or other foreign material has been removed from the pipe and fittings but before they are installed, the Contractor shall thoroughly mop or spray the inside surfaces of all pipes and fittings with a one percent (1%) hypochlorite solution. Long-handled brushes and mops shall be provided by the Contractor where required for the above specified cleaning and disinfecting work, and the hypochlorite solution shall be renewed as often as required to keep it free of dirt or foreign matter.
- C. After each pipe and fitting has been mopped or sprayed with the hypochlorite solution, the ends of the pipe or fitting shall be sealed by means of an approved type of wooden or rubber plug, which shall be thoroughly cleaned and washed with the same hypochlorite solution before being inserted into the ends of the pipe or fitting. The plugs shall not be removed until the pipe or fitting is lowered into the trench ready for socketing and then only for the joint to be immediately socketed. If the plugs have been removed prior to this time, the Contractor shall then repeat the processing of cleaning and disinfecting the pipe, and inserting the plugs.
- D. Prior to starting work, the Contractor will be required to show that he has available the equipment and materials for cleaning and disinfecting pipe and maintaining it clean during the laying process, all as herein specified.

- E. No pipe or fitting will be installed by the Contractor until such equipment and materials have been approved by the Engineer and are at the site or sites where the work of cleaning and disinfecting is to be done.
- F. Pipes or fittings delivered to the site of the work must be stored to prevent the entrance into the pipes of surface drainage, excavated material or other foreign matter.
- G. After the main has been laid, but prior to putting it into service, it shall be thoroughly disinfected with a chlorine solution of 300 ppm. This solution shall have a minimum contact time of 15 minutes and be thoroughly flushed before putting the main in service and opening service lines. This should be accomplished by having the 1½ inch tap used for flushing only slightly open during the first fifteen minutes, followed by a complete flushing the system of all excess chlorine. In all cases, this flushing shall not be less than fifteen minutes after the tap is fully open. Injection of chemicals shall take place through a tap inserted in the line for that purpose by the contractor, the point of application to be at one end of the pipe section with the bleed at the opposite end.
- H. No services shall be transferred to the new main, nor shall the main be put into service for domestic consumption until the sanitary condition of the interior of the main is satisfactory to Representative of the NYCDEP.

END OF SECTION

SECTION 33 11 10

CEMENT LINED DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Furnish and deliver cement lined ductile iron pipes and fittings of the sizes shown on the plans. Construct on 12" stone bedding wrapped in filter fabric.

1.03 STORAGE

- A. All pipes and fittings shall be stored in a manner and location acceptable to the Engineer.

1.04 RELATED SECTIONS

Section 31 23 33 - Excavating, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 11 17 - Filter Fabric for Utility Pipes & Manholes
Section 33 12 13 - Wet and Dry Connections to Existing Water Mains
Section 33 12 16 - Water Main Valves
Section 33 08 10 - Cleaning and Disinfecting Water Mains

1.05 SUBMITTALS

- A. Certification: Certificates of compliance with referenced standards.
- B. Product Data: Catalog cuts of piping and fittings.
- C. Method of Procedure: Submit in writing methods and procedures for performing leakage tests.

The Engineer's acceptance stamp on shop drawings shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity or quality.

Deviations: Should the Contractor desire a deviation from the Drawings or Specifications, or both, the Contractor shall call the specific deviation to the Engineer's attention in writing prior to the submittal of shop drawings showing the subject deviation. Requests for deviations shall be submitted on the Contractor's letterhead. Deviations not identified, or identified only in letters of transmittal or in shop drawings or both, without the required written description on the Contractor's letterhead may not be accepted and shall be sufficient cause for the Engineer to return each shop drawing including such deviations, rejected without further action. Acceptance of shop drawings including deviations not detected by the Engineer shall not relieve the Contractor of responsibility for any error that may occur. Deviations will be allowed only where permitted by the Engineer in writing.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE

- A. All ductile iron pipe to be supplied under these specifications shall be manufactured in accordance with Section 2.01 of the Standard Water Main Specifications, and shall comply with

ANSI Specification A 21.51/AWWA C 151, latest revision. The thickness class for all ductile iron pipe up to and including 12" shall be class 56. Pipe over 12" shall be class 55. Pipe is to be furnished with push on type joints per ANSI Specification A 21.11/AWWA C 111, latest revision, complete with gaskets and lubricant.

- B. All ductile iron pipe furnished under this contract shall be cement lined in accordance with ANSI Specification A21.4/AWWA C 104, latest revision, except that the cement-mortar thickness shall be double the minimum thickness shall be double the minimum thickness specified therein. Pipe shall be seal coated inside and out.
- C. All joints for water main pipe 20" diameter and under shall be restrained as specified in NYCDEP Specification Section 2.01, using push-on joints with "Field-Lok" gaskets.

2.02 FITTINGS

All fittings shall be mechanical joint, shall be cement mortar and lined, and fittings of all sizes shall be class 250. All fittings shall be made in accordance with American Standard A21.11/AWWA C 111, latest revision. Sealing gaskets, follower glands, lubricant, tee head bolts and hexagonal nuts shall be provided in sufficient quantities for each fitting. All fittings furnished under this contract shall also meet all the requirements of ANSI A21.12 AWWA C110, latest revision. Valves shall be gate valves per NYCDEP Standard Water Main Specification Sections 2.05, 2.06, and 5.05.

PART 3 - EXECUTION

3.01 METHOD

- A. The Contractor shall install all water mains in the project area in accordance with NYCDEP standard specifications except all the mains shall be encased in polyethylene sleeve bedded and backfilled as shown on the plans and in accordance with these specifications. In cases where the Contractor is connecting to existing piping constructed of cast iron, the joints of existing cast iron pipe shall be restrained in accordance with NYCDEP Standards.
- B. The restoration of the paved or unpaved surfaces shall be done to meet existing pavement surface.
- C. The Contractor shall clean and disinfect water mains as specified in Section 33 08 10.

3.02 FIELD TESTS

The Contractor shall perform leakage tests on installed water mains in accordance with NYCDEP Standards and shall be witnessed by the Engineer.

END OF SECTION

SECTION 33 11 16

INSTALLATION OF WATER MAINS AND APPURTENANCES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 - General Requirements, apply to this Section.

1.02 DESCRIPTION

- A. Install water mains and appurtenances of sizes shown on the plans, according to NYCDEP, Bureau of Water Supply standard drawings and specifications.

1.03 SUBMITTALS

- A. Method of Procedure: Submit in writing methods and procedures for performing leakage tests.

1.04 RELATED SECTIONS

Section 33 11 10 - Cement Lined Ductile Iron Pipe and Fittings for Water Mains
Section 33 12 16 - Water Main Valves
Section 33 11 17 - Filter Fabric for Utility Pipes & Manholes
Section 33 12 13 - Wet and Dry Connections to Existing Water Mains
Section 33 08 10 - Cleaning and Disinfecting Water Mains

PART 2 – PRODUCTS

2.01 MATERIAL

- A. Refer to Sections 33 12 16, 33 11 17 – 33 12 13 of these specifications.

PART 3 - EXECUTION

3.01 METHOD

- A. The Contractor shall install all water mains in the project area in accordance with NYCDEP standard specifications except all the mains shall be bedded and backfilled as shown on the plans and in accordance with these specifications. In cases where the Contractor is connecting to existing piping constructed of cast iron, the joints of existing cast iron pipe shall be restrained in accordance with NYCDEP Standards. All ductile iron water mains shall be encased in a polyethylene sleeve.
- B. The restoration of the paved or unpaved surfaces shall be done smoothly and evenly to meet existing pavement surface.
- C. The Contractor shall clean and disinfect water mains as specified in Section 33 08 10.

3.02 FIELD TESTS

The Contractor shall perform leakage tests on installed water mains in accordance with NYCDEP Standards.

END OF SECTION

SECTION 33 11 17

FILTER FABRIC FOR UTILITY PIPES & MANHOLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Furnish and deliver filter fabric in accordance with the specifications.
- B. Install filter fabric around the stone bedding and sand fill for sewers and underdrains as shown on the plans.

1.03 SUBMITTAL

- A. Product Data: Submit manufacturer's material certificate, specifications and recommendations for installation.

1.04 RELATED SECTIONS

Section 31 23 33 - Excavating, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers

PART 2 - PRODUCTS

2.01 MATERIAL

- A. For NYCDEP Facilities:
- Filter fabric for water main trenches shall be Mirafi 500X or approved equal, per NYCDEP Standard Water Main Specification (SWMS) Section 2.27.
 - Filter fabric for sewer trenches for ductile iron pipe connections from catch basins and ductile iron house connections shall be Mirafi 140 or approved equal, per NYCDEP Sewer Design Standard Dwg. No. SE-61.
- B. For Other Utilities:
Highly permeable nonwoven fabric with the following specifications.

Property	Test Method	Unit	Minimum Value
Grab Tensile	ASTM-D-4632	lbs	120
Grab Elongation	ASTM-D-4632	% min	50
Mullen Burst	ASTM-D-3786	psi	300
Puncture	ASTM-D-3787 (mod)	lbs	90
Trapezoidal Tear	ASTM-D-4533	lbs	50
U.V. Resistance (Strength Retained)	ASTM-D-4355	lbs	70
Equivalent Opening Size	CW02215	U.S. Sieve Number	70 min.
Permittivity	ASTM-4491	Sec-1 gal/min/ft ²	0.7

- B. The fabric rolls should have minimum roll average property values at least 95%.
- C. The packaging and labeling of the filter fabric shall be according to ASTM procedures.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The filter fabric shall be installed as shown on the plans, the manufacturer's instructions and specifications, Bureau of Water supply and Wastewater Collection Standard Drawings and Specifications.

Suggested manufacturer or approved equal:

Amoco Fabrics and Fibers Company
900 Circle 75 Parkway
Suite 300
Atlanta, Georgia 30330

END OF SECTION

SECTION 33 12 13

WET AND DRY CONNECTIONS TO EXISTING WATER MAINS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Furnish and install a water tap and wet and dry connections to existing water mains where shown on the drawings conforming with NYCDEP standards.
- B. Cap the water line in accordance with the plans, specifications, and conform with NYCDEP standards.

1.03 RELATED SECTIONS

Section 33 11 10 - Cement Lined Ductile Iron Pipe and Fittings for Water Mains
Section 33 12 16 - Water Main Valves

1.04 SUBMITTALS

- A. Shop Drawing: Submit shop drawings of wet and dry connections to existing water mains. Include the material designation for all components.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Products shall meet the standards of NYCDEP.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with requirements of the NYCDEP and the manufacturer of the wet and dry connections to the existing water mains.
- B. All connections shall be tested in accordance with the requirements of the NYCDEP.

END OF SECTION

SECTION 33 12 16

WATER MAIN VALVES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. To furnish and deliver various sizes of water main valves and valve boxes as shown on the plans and conform with NYCDEP standard specifications.

1.03 STORAGE

- A. All valves shall be stored properly as specified in NYCDEP standards.

1.04 RELATED SECTIONS

Section 31 23 33 - Excavating, Backfilling and Compaction For Pipes and Utility Trenches
Section 33 11 16 - Installation of Water Mains and Appurtenances
Section 33 11 17 - Filter Fabric for Utility Pipes & Manholes

1.05 SUBMITTALS

- A. Shop Drawing: Catalogue cuts and shop drawings.

PART 2 - PRODUCTS

2.01 MAINLINE AND HYDRANT VALVES

- A. All valves shall comply with Sections 2.05, 2.06, and 5.05 of the NYCDEP Standard Water Main Specifications.

2.02 PLUG VALVES FOR IRRIGATION AND SMALL SERVICES

- A. Valves two inches (2") and under shall be of the cylindrical Plug Type with a closed bottom and a top seal, fully enclosed one-quarter (1/4) turn check, straight through flow way which is resistant to turbulence of the flow stream, one piece cast bronze cylindrical plug and "T" head that aligns with the ports to provide a visual check of valve position, inside screw ends with I.P. threads, as is manufactured by Mueller Co. No. H-10283, or approved equal. Adaptors are required for connecting to copper tubing.
- B. An approved operating key of proper size for each valve shall be furnished by the Contractor, except that the Contractor need not furnish more than two (2) keys for each type of valve, regardless of the quantity of valves called for in the contract. For plug valves two inches (2") and under, the operating key shall be Mueller Co. No. H-10322, or approved equal. For gate valves greater than two inches (2") the operating key shall be Stockham No. 1V437, or approved equal.

2.03 VALVE BOX FOR IRRIGATION AND SMALL SERVICES

- A. Box: 5 ¼" diameter valve boxes shall be Bingham & Taylor Fig. No. 4908 with a Fig No. 4904-L locking cover, or approved equal. The cover shall have the designation "WATER" cast thereon. The boxes shall extend within the limits called for on the plans.
- B. Setting: The valve boxes shall be set plumb, as shown on the plans, on a footing of brick laid in cement mortar, supported on a foundation of broken stone.
- C. Brick: The brick shall be made from clay or shale, well burned, of a quality approved by the Engineer. The mortar shall be composed of one part Portland Cement and two parts sand.

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

SECTION 33 12 18

RPZ AND WATER METER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

- A. Under these Items, the Contractor shall provide all labor, materials and equipment necessary or required to furnish and install RPZ & WATER METER W/ REMOTE & STRUCTURE of the size indicated, including all piping, fittings, valves, test tee, and test tee valve, if required and other incidentals necessary to complete plumbing work and connection to water service and water feed lines in accordance with the plans, specifications, and directions of the Engineer. RPZ (Reduced Pressure Zone) device is also known as a Backflow Preventer. Water Meter W/ Remote Reader shall include Water Meter, Water Meter Strainer and Automatic Reading & Billing System (also known as Remote Reading Device). All factory plumbing work is to be done by a Licensed Plumber. All on-site plumbing work is to be done by a New York City Master Licensed Plumber. The Contractor shall comply with all rules, regulations, and requirements of all regulatory agencies having jurisdiction.

1.03 RELATED WORK

- A. Related work is described in the following sections of the specifications:

Section 33 12 20: Type K Copper Tubing

1.04 SUBMITTALS

- A. Shall be submitted in accordance with the requirements of the General Conditions.
 - 1. Shop Drawings: The Contractor shall submit Shop Drawings of the complete RPZ assembly, water meter, piping, pipe supports, and the precast concrete structures.
 - 2. Catalog Cuts: The Contractor shall submit Catalog Cuts of the RPZ, water meter, meter reading system, control valve, and all connected piping for approval prior to installation.
 - 3. Certifications: The Contractor shall be responsible for obtaining all certifications necessary to comply with the NYC Bureau of Water Supply & Wastewater Collection, Cross Connection Control Unit & the NYS Dept. of Health regulations for RPZ's (after installation), including Certification by Backflow Prevention Device Tester; Certification of Master Plumber responsible for the RPZ installation, and a Professional Engineer's or Registered Architect's Certification that the installation is in accordance with the approved Plans. The Contractor shall prepare and submit copies of NYC Form Gen. 215B to the NYS Dept. of Health & NYC Cross Connection Control Unit of the Bureau of Water Supply & Wastewater Collection. In summation, the Contractor shall be held completely responsible to ensure that all Work is in compliance with NYC Form Gen. 215B.

PART 2 MATERIALS

Unless otherwise provided for herein, all materials and methods of construction shall conform to the requirements in Section B, "Materials and Methods of Construction".

2.01 Precast Concrete Structures:

Enclosure structures for the RPZ and water meter shall be as manufactured by A.C. Miller Concrete Products Inc., Spring City, PA., or approved equal.

2.02 Concrete:

All concrete shall fulfill the material requirements of Section B, except that compressive strength shall be 5,000 psi at 28 days. All precast concrete shall have a honed finish. The precast concrete shall be well cured, shall be dense and shall have good edges. The cement and aggregate shall be thoroughly mixed in a proportion of one (1) part Portland Cement to not over six (6) or less than four (4) parts of aggregate. The aggregate fine and course shall conform to ASTM C-33. Aggregate shall be free of all deleterious substances which cause reactivity with oxidized hydrogen sulfides. Aggregate shall be graded to produce a homogeneous concrete mix.

2.03 Reinforcement:

Steel reinforcement shall conform to the provisions for "Steel Bar Reinforcement" and "Steel Fabric Reinforcement". Reinforcement shall be placed as shown on the drawings.

2.04 Ladder Rungs:

Ladder rungs for each water meter structure shall be constructed of copolymer polypropylene plastic, as manufactured by M.A. Industries, Peachtree City, Ga., or approved equal.

2.05 RPZ Structure Access Doors:

Doors shall be JustSet Doors as manufactured by Pennsylvania Insert Corp., Spring City, PA, or approved equal. The two (2) types of RPZ Structure doors as follows:

- A. Two (2) vertical 30" x 24" (hinged) high security stainless steel access doors.
- B. One (1) Horizontal 12" x 24" (no hinges) high security stainless steel access door.

2.06 Water Meter Structure Access Door:

Access door shall be 36" x 30" size, heavy duty (H20 loading) high security color (brown) anodized aluminum access doors such as JustSet Doors, as manufactured by Pennsylvania Insert Corp., Spring City, PA, or approved equal. Frame shall have integral drain channel, anchor flanges, and neoprene gasket. A one-and-one half inch drain (1 1/2") coupling shall be located on the corner of the frame. Operation shall be spring assisted for easy operation. A hold open arm shall automatically lock the door in the 90° position. Hinge shall be heavy forged brass with a stainless steel pin. Door shall be provided with two locks. Lock shall be "Ford" lifter worm lock with waterworks bronze

pentagonal bolt type "LL". All hardware shall be zinc or cadmium plated.

2.07 Construction Accessories:

Frames shall be 3/16" x 2" x 2" angle welded with joints ground smooth, after fabrication. Hinges shall be heavy duty and welded to door and frame.

2.08 Security Bolts for RPZ Structure:

Security Bolts for RPZ Structure shall be provided by the Owner.

2.09 Security bolts for Water Meter Structure Horizontal Door:

Security bolts for Water Meter Structure Horizontal Door shall be two (2) pentahead security bolts.

Special Design Criteria For Security Bolts:

1. Bolt must be made from alloy steel, heat treated to 150,000 psi tensile strength.
2. Head of bolt must be selectively hardened to Rc 60 min. to prevent the use of files, hacksaws, and chisels.
3. Bolt is to be made with either a flat or 120° cone seat as required.
4. Bolt will be torqued by means of a recessed curvilinear ("Daisy") groove in the top face of bolt head. A special mating key is required to operate in groove for installation and removal of bolt.
5. Bolts are to be zinc nickel plated in order to meet an ASTM B-368 C.A.S.S. test for 22 hours.
6. Bolt lengths are to be held to +/- .01".
7. Bolt threads are to be class UNC-2A.

2.10 Water Piping:

Shall be hard temper type 'K' copper tubing meeting the Department of General Services; Division of Municipal Supplies, Dept. of Purchase, Specification No. 32-T-1.64 and ASTM No. B88-1974. Fittings shall be approved wrought copper and bronze solder-joint pressure fittings (ANSI B 16.22).

2.11 RPZ:

The RPZ (Reduced Pressure Principle Backflow Prevention device) shall be Conbraco Series 40-200; Febco Model LF825YA, or approved equal. Size shall be as indicated on the Contract Drawings and shall fit inside the precast concrete structure as shown on the Standard Detail. The RPZ shall meet the requirements of American Society of Sanitary Engineers (ASSE) Standard 1013 and the American Water Works Association (AWWA) Standard Code 506-78. RPZ shall be lead free in compliance with the amended Federal Law Safe Drinking Water Act (SDWA).

The RPZ shall consist of two independently operating center guided, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve. Mainline valve body and caps including relief valve body and cover shall be bronze. Check valve and relief valve components shall be constructed so they may be serviced without removing the valve body from the line. Shut-off valves and test cocks shall be full ported resilient seated ball valves.

2.12 Gate Valves and Ball Valves:

The House Control Valve (HCV and Valve for Test Tee shall be Class 125, all bronze gate valve, with non-rising stem and solid disc, with screwed bonnet and threaded ends, such as Stockham Figure LFB-103, or approved equal. For meters larger than one and one-half (1.5") inches, the test tee shall be with a valve and capped.

The Meter Inlet Control Valve (MICV) and Meter Outlet Control Valve (MOCV) shall be lead free, brass, full port ball valve such as Ultra Pure UPBA400 P2, or approved equal.

2.13 Electrical Grounding:

For continuity of Electrical Grounding (during RPZ Maintenance) the Contractor is to furnish and install one (1) #2 tinned copper ground conductor and copper alloy ground connectors as per O.Z. Gedney, Type ABG for 1" & 1-1/2" dia. and CG for 2" dia. pipe or approval equal. Ground work is to be done prior to any painting or insulation if needed.

2.14 Water Meter:

The two (2") inch water meter shall be Omni C² manufactured by Sensus or Spectrum 130D manufactured by Metron Farnier, LLC, Boulder Co, or approved equal.

All water meters furnished shall conform to the "Standard Specifications for Cold Water Meters", AWWA Standard C700 latest revision. Only meters on the current "List of Approved Water Meters and Related Equipment", published by NYC DEP will be accepted as an approved equal.

The size, capacity and meter lengths shall be as specified in AWWA Standard C700, latest revision. The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision to minimize premature wear. The installation of water meters shall comply with RCNY Title 15, Chapter 20, "Rules and Regulations Governing and Restricting the Use and Supply of Water".

2.15 Meter Maincase:

All meter maincases shall be composed of an alloy that meets current NSF61G/372 standards. Bottom caps shall be interchangeable, size for size, between frost-protected synthetic polymer or cast iron and non-frost protected (bronze) models. No meters utilizing frost plugs will be accepted. Non-frost protected meters shall have bronze or synthetic polymer bottom caps. The cross section of the bottom shall break clean when subjected to freezing pressure of 600-850 psi. All maincase bolts shall be of 300 series stainless steel to prevent corrosion. Bottom cap bolt lugs shall be enclosed in the maincase and shall not have externally exposed, threaded through holes.

2.16 Register:

Registers must be sealed and dry. All direct reading register lenses shall be flat, of high strength, and impact resistant glass to prevent breakage. All meters must be adaptable to digital encoder register without interruption of the customer's service for the purpose of pit, remote, or central meter reading. The registers shall be secured to the maincase by means of a plastic tamperproof seal pin to allow for in-line service replacement. Seal

screws are not acceptable.

Register retainer rings shall have an impact resistant design which absorbs register glass lens impact. All registers shall have the size, model, and date of manufacture stamped on the dial plate.

2.17 Measuring Chamber:

The measuring chamber shall be a nutating disc type, the flat nutating disc shall be molded of a non-hydrolyzing hard rubber or synthetic polymer and shall contain a type 316 stainless steel spindle. The nutating disc shall be equipped with a synthetic polymer thrust roller with a stainless steel shaft located within the disc slot. The roller head shall roll on the buttressed track provided by the diaphragm in the measuring chamber. The measuring chamber shall be of a 2-piece snap-joint type. The measuring chamber shall be made of non-hydrolyzing synthetic polymer, shall be smoothly and accurately machined and shall contain a removable molded diaphragm of the same material as that of the chamber. No screws shall be used to secure the chamber together. The control block shall be the same material as the measuring chamber and be mounted on the chamber top to provide sand ring protection. The control block assembly shall be removable to facilitate repairing. Control block assemblies shall be designed to allow no magnetic slippage which would result in a loss of revenue. The measuring chamber outlet port shall be sealed to the maincase outlet port by means of an "O" Ring gasket to eliminate chamber leak paths.

2.18 Guarantee:

All meters and registers will be guaranteed for one year on material and workmanship. To ensure accuracy, each meter must be accompanied by a factory test tag certifying the accuracy at the flows required by AWWA C700 (low, intermediate, and full flow). All meters shall be guaranteed adaptable to the Neptune ARB Encoder Electronic Meter Reading Systems.

2.19 Strainer:

The strainer shall be located near the inlet maincase port, before the measuring chamber and control block assembly.

2.20 Remote Reader:

The Remote Reader shall be Neptune E-Coder System as manufactured by Neptune Technology Group, Inc., Tallahassee, AL, or ECR or Full Electronic Register as manufactured by Sensus, or Innov8 Register as manufactured by Metron Farnier, or approved equal. The Remote Reader shall be a self-contained encoder register metering system designed to obtain remote simultaneous water meter registration directly from the register odometer. The metering information shall be obtained through a remotely located receptacle using a compatible data capture system.

Encoder Meter Register: Shall be direct mounted with encoded odometer wheels and digital data stream. Batteries or pulses are not allowed.

Registration: The register shall provide a minimum five (5) digit visual registration at the meter. The unit shall, in a digital format, simultaneously encode the four or six most

significant digits of the meter reading for transmission through the remotely located receptacle. (The most significant meter registration digits are defined as those digits on the register number wheels that denote the highest recorded values of water consumption.) A quick indexing mechanism shall be employed which shall prevent ambiguous reading. The register shall have a full test sweep hand or dial divided into gradients of down to 1/100th of the units of registration. Register test rings shall be available for shop testing. The units of registration shall be in U.S. gallons. These units shall be clearly designated on the face of the register. The month and year of manufacture and other identification information shall appear on the face of the register. The register shall employ a leak detection indicator on the dial face. Registers using pulse generation or conversion of pulses to digital output is not permitted. Batteries shall not be required.

2.21 Mechanical Construction:

Materials used in the construction of the register shall be compatible with the normal water meter environment and with each other. The unit shall possess a copper bottom and incorporate a rubber O-ring seal. Where indicated, pit set registers must be provided with moisture protection for all internal components when operating under flooded pit conditions. The register and mounting base shall be integral components and should not allow for disassembly. The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamperproof plastic seal pin shall be used to secure the register to the main case. No special tools shall be required to remove the register. The register head must swivel 360 degrees without removing the seal pin to facilitate visual reading and ease of wiring. The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service. Provision shall be made in the register for the use of seal wires to further secure the register. Terminal screws must be accessible on the register for transmission wire connection to the remote receptacle or future connections to a telephone system.

2.22 Electrical Construction:

The materials employed for contacts and connectors shall inhibit corrosion and shall suffer minimal effect from environmental conditions to which they are exposed. The number wheels used in the register assembly shall be provided with spring-type bifurcated metal contacts to insure a high probability of information transmission.

Connection shall be made to the register by three screw-type terminals, sonically inserted into the register top. Access to the terminals shall be available to all models of register. A port cover shall be provided to cover the terminals after they have been wired. Digitally formatted data transmitted from the register shall incorporate a check sum character to verify correct information transmission and integrity. Data errors shall be indicated by the reading equipment.

2.23 Meter Reading Information:

The encoder register shall provide up to six digits of information to the reading equipment. A ten digit identification number shall also be provided with each reading. The utility shall have the option to reprogram the internal register identification number an unlimited number of times. The encoder register must have the capability to provide additional custom information to the reader. This information shall be programmed (and

reprogrammed at any time) by the utility. Information on programming the register, equipment needed, and encoder meter reading output shall be provided with each proposal.

2.24 Remote Mounted Receptacle:

Remote receptacle shall provide a communication link for the transmission of information from the register.

2.25 Mechanical Construction:

Where indicated, a remote receptacle must be provided for attachment to a pit meter lid with another unit also designed for attachment by wall mounting. The materials employed shall be corrosion resistant, resist ultraviolet degradation, unaffected by rain or condensation, and compatible with rugged service and long life. The pit mounted receptacle shall be mounted to the water meter access door of the meter concrete structure using two screws to be provided by the utility. The hole size to be drilled in the access door shall not exceed 3/8" each. The pit mounted receptacle shall be provided with a minimum length of ten feet of wire connected and sealed at the receptacle without terminal exposure.

2.26 Electrical Construction:

The receptacle construction shall incorporate the function of a cable clamp or strain relief. Design of the unit shall be such that it provides for mechanical and electrical connection between the receptacle and interrogation equipment.

2.27 Cable:

The connecting cable shall be of the two-wire conductor type in a sheath which shall be abrasion and moisture resistant. Each conductor shall be color coded.

PART 3 EXECUTION

3.01 Excavation:

The Contractor shall excavate to the lines as shown in the drawings. Temporary sheeting is required in excavation for the precast concrete structure. This work is detailed in the separate specification "Temporary Sheeting".

3.02 Setting of Precast Concrete Water Meter Structure:

The precast concrete water meter structure shall be set on a six (6) inch thickness of broken stone with additional stone added inside the twelve inch (12") x twelve inch (12") drain sleeve to the top of the bottom slab. The RPZ Structure shall be set on the Water Meter Structure, as shown in the Contract Drawings.

The Contractor shall install supports for the water meter at the height shown on the Contract Drawings. The meter shall be set so that the dial faces upward and is horizontal. The dial shall not be more than three (3) feet above the floor. The encoder register shall be installed on meter as per manufacturer's instructions. The remote reader receptacle shall be installed in the pit cover as per the manufacturer's directions

and recommendations, allowing reading of the meter from above ground level. The Contractor to allow sufficient Water Meter Remote Reader cable slack for manhole cover removal. The RPZ shall be installed as shown on the Contract Drawings and per manufacturer's instructions.

3.03 Connections:

The Contractor shall connect the water piping as shown on the Contract Drawings for complete and satisfactory operating unit to the satisfaction of the Engineer. Connections shall be made to The Water Meter by coupling union or flange union on both inlet and outlet ends of the meter and bored for sealing with holes not less than one-eighth (1/8) of an inch in diameter - solder connections are not permitted. Connections to the RPZ shall be as shown on the Contract Drawings and per manufacturer's instructions.

EXTRA MATERIALS:

The Contractor shall furnish one RPZ Major Repair Kit per unit supplied (furnish only, not install) and deliver to the Owner.

One (1) Each. RPZ Major Repair Kits as manufactured by Conbraco or Febco, or approved equal to match the make and size installed, consisting of new materials obtained from the RPZ manufacturer installed. Repair kit shall include all consumable or replacement items including but not limited to relief valve seat disc and check seat disc, bushings, washers, o-rings, bolts, etc. All furnished material shall be properly identified with the RPZ model, size and installation location.

END OF SECTION

SECTION 33 12 20

TYPE K COPPER TUBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under this item the Contractor shall furnish, install and connect the water pipe of the size shown in accordance with the plans, specifications and directions of the Construction Manager.

1.03 RELATED SECTIONS

Section 33 12 16 – Water Main Valves

1.04 SUBMITTAL

- A. Product Data: product data sheets for each type of product.

PART 2 - PRODUCTS

2.01 PIPE

The water service pipe shall be rigid hard temper type "k" copper tubing in straight lengths meeting the specification for ASTM designation No. B88.

2.02 FITTINGS

Fittings shall be approved wrought copper and bronze solder - joint pressure fittings (ANSI B 16.22), Di-Electric fittings as required.

2.03 JOINTS

Joints shall be made by soldering, using 95-5 tin antimony solder. From the curb valve to the water tap, joints shall be of the "flared" type.

PART 3 - EXECUTION

3.01 METHOD

- A. The pipe shall be laid true to line and grade with a cover as indicated on the plans or as directed by the Engineer. When the foundation is good firm earth, the earth should be pared or molded to give a full support and if necessary a layer of fine sand or other suitable material should be placed. The same means of securing firm foundation should be adopted in case the excavation has been made deeper than necessary, in which case the Contractor shall furnish the gravel at his own expense.
- B. Where the bottom of the trench is in rock, fresh fill, soil of low bearing power or other situations where special foundations are required, the Contractor shall provide such foundation in accordance with the written order of the Engineer. The work shall be paid for at the unit prices bid for the materials used in the work.

3.02 FIELD TESTS

- A. The Contractor shall not backfill over any pipe until ordered by the Engineer. The pipe system shall be tight and show no leaks when filled with water, sealed and subjected to an internal hydrostatic pressure of 100 psi for thirty minutes. Temporary caps shall be placed where required to permit making the tests where valves are not available. The tests shall be made in the presence of the Engineer

END OF SECTION

SECTION 33 12 26

FIRE HYDRANTS WITH FENDER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under these Items, the Contractor shall furnish all labor, materials and equipment necessary or required to install FIRE HYDRANTS WITH FENDER, including all plumbing work and connection to water service in accordance with the plans, specifications, and directions of Engineer.

1.03 SUBMITTALS

- A. Submit manufacturer's specifications and certificates of compliance with referenced standards.
- B. Catalog Cuts

1.04 RELATED WORK

- A. Related work is described in the following sections of the specifications:

33 11 16	Installation of Water Mains and Appurtenances
33 11 17	Filter Fabric for Utility Pipes and Manholes
33 12 16	Water Main Valves

PART 2 PRODUCTS

2.01 MATERIALS

- A. All materials and installation shall conform to NYC DEP Standard Details and to the requirements set forth by the New York City Bureau of Water Supply, Department of Environmental Protection (DEP)
- B. Hydrants: All hydrants installed shall be a two-piece "Breakaway" hydrant, Types S2-LP or D2-LP as shown on BWS Standard Drawing Nos. 43250-Z or 43142-Z, respectively. Hydrant shall be the "A.P. Smith Hydrant" as manufactured by U.S. Pipe and Foundry, Birmingham, AL, or the "Dresser 500 Style" as manufactured by M & H Valve, Anniston, AL, or equivalent model pre-approved by D.E.P. **Any models not pre-approved by DEP will NOT be acceptable.**

All parts of the hydrant shall be interchangeable with similar parts of hydrants of the same size and type. An arrow and the word "OPEN" shall be cast in relief on top of the hydrant showing the direction to turn in order to operate the hydrant. All bolt holes shall be accurately drilled from templates. All joints shall be faced smooth, so as to make a perfectly water-tight joint. Hydrant hose caps shall be securely attached to the hydrant by means of chains. The connections and nozzles shall have threads matching those in use by the New York City Fire Department.

Each hydrant shall be shop tested under 300 psi applied above the compression valve. Any hydrant showing sweating of the metal or leaking or other defects shall be rejected. All tests shall be made at the expense of the Contractor.

- C. VALVE AND VALVE BOXES: Refer to Section 33 12 16.
- D. LATERAL HYDRANT CONNECTION PIPE: Pipe shall be 6" Ductile Iron Pipe Class 56, meeting requirements of Section 33 11 10.
- E. HYDRANT FENDERS: Fenders shall be extra heavy galvanized steel pipe, 5.6" O.D. and shall conform to ASTM Serial Designation A-120, Schedule 80, except that pipe shall be unthreaded and untested for water pressure. A malleable iron or cast iron screw cap shall be tack welded to cap the fenders after the pipes are filled with concrete. Steel pipe hydrant fenders shall be installed and encased in concrete collars in accordance with the applicable layout, method and details shown on NYC DEP Bureau of Water Supply Standard Drawings No. 45161-Z-A.
- F. PAINT: Paint for standpipe shall be heavy-duty enamel paint VOC-complying, color shall be black.
- G. Paint for hydrant dome and steel fenders shall be heavy-duty rust resistant aluminum paint, such as "Silver-Brite[®] Heavy Duty Rust Resistant Aluminum Paint" as manufactured by The Sherwin-Williams Company, Woodside, NY, or approved equal. Painting and coating of the hydrant shall be as prescribed in AWWA C-502, latest revision.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Each hydrant shall be installed and connected to the existing water main as shown on BWS Standard Drawing No. 18581-B-Z, "Standard Hydrant Connection for Steel and Ductile Cast Iron Water Mains". Installation of hydrant and all related plumbing work shall be performed by a licensed plumber.
- B. HYDRANT: Hydrant shall be placed so that centerline of hydrant is approximately two (2'-0") feet behind the back of the curb. The pumper nozzle shall face the road. Hydrants shall be set plumb and installed to proper height.
- C. Each fire hydrant shall be installed on a concrete pad not less than six (6") inches thick and have a minimum area of three (3') feet by five (5') feet. Concrete pad shall have a broom finish. The backside of the hydrant, opposite the pipe connection shall be firmly blocked against the vertical face of the trench to prevent the hydrant from blowing off the line. If the character of the soil is such that the hydrant cannot be securely blocked, then bridle rods and rod collars shall be used. Bridle rods and rod collars shall be less than three-fourths (3/4") inch stock, and shall be thoroughly protected by painting with acid resisting paint.

- D. Around the base of each hydrant shall be placed not less than seven (7) cubic feet of broken stone to ensure the complete drainage of the hydrant when closed. All backfill around hydrants and valves shall be thoroughly and carefully compacted after correct positioning.
- E. Before installing any hydrant, care shall be taken to see that all foreign material is removed from the interior of the barrel. When hydrant is ready for service, the hydrant and valve shall be opened and closed to see that all parts are in working condition. After closing the main valve, a nozzle cap shall be removed and the standpipe interior inspected to make sure of proper drainage.
- F. HYDRANT FENDERS: Two (2) steel pipe hydrant fenders must be installed with the hydrant, unless otherwise directed by the Engineer in writing, in accordance with BWS Standard Detail No. 45161-Z-A. Posts shall be set in average concrete footings and, once installed, the steel pipe shall be filled with average concrete. Post caps shall be tack welded to the fender pipe.
- G. All fenders shall be set plumb and true to line and grade. The distance between the fenders shall be 4'-6", with the hydrant in the center.
- H. PAINTING: After the hydrant has been installed, the standpipe above the ground line shall be thoroughly cleaned and, with the exception of the dome, shall be given one heavy coat of quick drying black enamel paint. The dome and hydrant fenders shall receive one heavy coat of bright aluminum paint, as specified above. On the standpipe, just below the nozzles, on the roadway face of the hydrant, shall be stenciled, in white numerals five (5") inches high, the size of the water main to which the hydrant is connected. Paint for white numerals shall be an oil type paint, designed for exterior use. It shall cover solidly in one coat and dry to a satisfactory gloss.

3.02 TESTS

- A The Contractor shall not backfill over any pipe until directed by the Engineer. The pipe system shall be tight and show no leaks when filled with water, sealed, and subjected to an internal hydrostatic pressure of one-hundred twenty-five (125) pounds per square inch. Temporary caps shall be placed where required to permit making the tests where valves are not available. The tests shall be made in the presence of the Engineer.

END OF SECTION

SECTION 33 14 43
BOOSTER PUMP STATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION OF WORK

1. Coordinate all plumbing and electrical work with licensed tradespersons working on site during construction.
2. Ensure all work complies with all local plumbing and electrical codes. Coordinate with licensed tradespersons working on site for code compliance.
3. Packaged Pump Station supplier shall provide variable-speed end suction centrifugal pump station complete with pump, piping, valves, sensors, variable frequency drive (VFD), programmable logic controller (PLC), UL 508A listed control panel, and all appurtenances necessary for a complete and functioning pumping system.
4. Pump station shall be mounted to press brake formed steel base and enclosed in a powder-coated marine grade aluminum enclosure. Pump station shall be manufactured by a UL QCZJ and ISO 9001 certified pump station manufacturer.
5. Technical Service and Support
 - a. Manufacturer shall provide access 24/7 phone support with a factory certified technician.
 - b. Technician shall have access to all relevant data specific to the pump station, including specifications, submittal, shop drawings, programming, and detailed photos of the system.
6. Factory Testing.
 - a. Pump station shall undergo and pass all of the following system performance tests:
 - 1) Hydrostatic testing that meets ANSI/HI specifications and standards
 - 2) Flow testing that meets ANSI/HI 14.6 specifications and standards
 - 3) Vibration testing that meets ANSI/HI 9.6.4 Vibration Measurement and Allowable Values.
 - b. Pumping system shall be flow tested as a complete unit, which shall include function testing of pumps, motors, instrumentation, appurtenances, and control panel. Results of all tests shall be available to Owner.
6. Manufacturers/Models.
 - a. Precision Pump System, Model Nova Pump Station
 - b. Watertronics, Model Watermax 5000 Pump Station

1.03 SUBMITTALS

- A. Shall be submitted in accordance with the requirements of the General Conditions.
1. Shop Drawings

2. Catalog Cuts
3. Certifications

PART 2 - PRODUCTS

1. Pipe, Valves, Skid Base, & Station Enclosure.
 - a. Piping
 - 1) Station piping shall be standard wall pipe with grooved connections.
 - 2) Flanged or welded connections shall not be acceptable.
 - 3) Threaded connections between the main piping sections other than at pump volute shall not be acceptable.
 - b. Valves
 - 1) Butterfly style isolation valves with grooved connections shall be included on station suction and discharge pipe.
 - 2) Flanged or threaded connections shall not be accepted.
 - 3) Non-slam check valve shall be included on the discharge of each pump.
 - 4) Air release valve shall be included, located immediately after pump check valve.
 - c. Skid.
 - 1) Pump skid shall be made of 1/4-inch press broke A36 steel.
 - 2) No welded bases or open rail systems shall be acceptable.
 - d. Corrosion Protection.
 - 1) Pump skid and appurtenances shall be cleaned to bare steel and coated with baked-on powder coating
 - 2) All pipe including elbows shall be coated inside and out.
 - 3) Pump station shall be pressure tested prior to coating. No welding shall be performed after pump station is powder coated.
2. Pump Control System
 - a. NEMA Rating
 - 1) VFD, PLC, and associated electrical equipment shall be mounted in NEMA 12 enclosure.
 - 2) To avoid potential water or rodent damage, VFDs mounted outside the main control panel are not acceptable.
 - b. Control Panel Manufacturing & Testing
 - 1) Pump control panel shall be manufactured and listed by a UL508A Panel Shop.
 - 2) Panel shall be UL labeled as "Enclosed Industrial Control Panel".
 - 3) Pump control panel shall be completely manufactured, tested and programmed prior to delivery to Site.
 - c. Documentation
 - 1) Color wiring schematic and pump nameplate information shall be permanently affixed to inside of control enclosure.
 - 2) All field terminal connections shall be numbered and labeled.
 - d. Cooling System
 - 1) Control panel cooling system shall be appropriately sized for the ambient conditions.

- 2) Cooling system shall not allow dust, insects or rodents inside the pump control panel.
 - 3) Two sets of spare filters shall be included with the pumping system.
 - e. Main Disconnect
 - 1) Service-entrance rated, non-fused disconnect shall be mounted in the pump control panel and shall isolate all power to the control panel.
 - 2) Disconnect shall include an operating handle mounted on the control panel enclosure door that is mechanically interlocked to prevent entry while the disconnect is in ON position.
 - 3) To prevent damage from vandalism, disconnects external to pump station enclosure shall not be accepted.
 - f. Overcurrent Protection
 - 1) VFD bridge rectifiers shall be protected from over current by an appropriately sized circuit breaker.
 - 2) Fuses are not acceptable.
 - g. Lightning & Surge Protection
 - 1) Pump Control Panel shall be equipped with transient voltage and surge arrestors.
 - h. Variable Frequency Drive (VFD)
 - 1) VFD shall be appropriately sized to meet the FLA (full load amps) required by the pump motor, as stated on the motor nameplate.
 - 2) VFD shall be manufactured by ABB Industrial Systems, Mitsubishi, or approved equal.
 - 3) Initial start-up and calibration shall be performed by a factory certified technician, which shall extend warranty on control panel to total of three (3) years.
 - i. Programmable Logic Controller (PLC)
 - 1) PLC shall be fully programmed prior to pump panel installation.
 - 2) Technician installing and programming the PLC is to be factory trained and certified by PLC manufacturer.
 - 3) PLC programming shall be non-proprietary, and the complete station programming shall be made available to the owner via a USB drive included with station control panel.
 - j. PLC Operator Interface
 - 1) PLC shall be equipped with a 5.7" LCD color touchscreen.
 - 2) Operator interface shall allow the user to adjust the PLC program locally without requiring any additional equipment such as a laptop computer.
 - 3) VFD control keypad is not an acceptable substitution for the digital operator interface.
 - 4) PLC shall have an Ethernet port to enable remote access.
3. PLC Control Functions
 - a. User settable Local or Remote control.
 - 1) System Pressure Setpoint
 - 2) Pump Sleep Settings, with two threshold modes: Sleep by Flow or Sleep by Frequency
 - 3) System Protection Settings, including fault and warning parameters for low flow, high flow, low pressure, high pressure, restart trials and restart delay time.
 - 4) Load Factory Default Settings, User Saved Default Settings.

- 5) Pre-Programmed Start-Up Routines to limit and/or delay starting and acceleration of the pump to eliminate excessive velocity and pressure. It shall also include initial start-up, mainline fill, power outage and automatic re-starts.
4. PLC Monitoring Functions
 - a. Pump operating status, total pump run hours, motor frequency, motor amperage
 - b. System pressure, flow rate
 - c. Fault Log with time stamps and diagnostic utility.
 - d. Trend Data, with graphic display of system pressure, flow, motor frequency and amperage. Data shall be exportable to MS Excel.
 - e. USB port to upload, download of program, and data storage.
5. Instrumentation
 - a. Pressure Gauges shall have a 304 stainless steel case, with bezel construction. Gauges shall have a 2.5" diameter and be liquid filled.
 - b. Pressure Transmitter(s) shall be constructed of stainless steel and rated for the pump station discharge pressure.
 - c. Flow Meter
 - 1) Pump station shall include magnetic flow meter.
 - 2) Flow meter shall have flange connections.
 - 3) Flow meter shall be capable of pulse and analog output.
 - 4) Current and totalized flow shall be read at pump control panel HMI.
 - 5) Insertion flow meters and sensors shall not be accepted.
 - e. Integration - Building Management System
 - 1) Pump station control system shall transmit VFD Macros data to Baseline Irrigation Controller for BACnet Communication with BMS.

PART 3 - EXECUTION

3.01 BOOSTER PUMP INSTALLATION

- A. Coordinate with site plumbing and electrical contractors for installation of booster pump on concrete pad. Coordinate with licensed personnel for installation, connection to utilities provided, and discharge routing to outdoors to landscape.
- A. Adjust pressure settings to match project requirements.
- B. Ensure that connections are watertight and that system does not vibrate or chatter.

END OF SECTION

SECTION 33 40 00

PRECAST CONCRETE DRAINAGE STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.
- B. **LIABILITY:** When using precast concrete drainage structures, the Contractor accepts full and complete responsibility for the location of knock-out holes that allow for the entrance of drainage pipes. All pipe invert dimensions shall be verified in the field by the contractor prior to ordering precast drainage structures. No additional compensation shall be paid by the RIOC of any discrepancies that may occur.

1.02 DESCRIPTION

- A. Under this item, the Contractor shall build or provide and install PRECAST CONCRETE DRAINAGE STRUCTURE in accordance with the plans, specifications, and directions of the Engineer.

1.03 RELATED SECTIONS

Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 23 33 - Excavation, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 42 16 - Precast Reinforced Concrete Pipe on Concrete Cradles
Section 33 44 00 - Catch Basin Connections
Section 33 49 10 - Parks Leaf Covers and Frames

1.04 SUBMITTALS

Shop Drawing: Showing all invert elevations must be submitted for approval, prior to use of the precast drainage structures. Precast drainage structures shall meet the requirements of NYCDEP.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE:

The use of factory precast concrete drainage structures may be substituted for brick masonry at no additional cost to the RIOC. Payment shall be made on a cubic yard basis of precast concrete at the same price bid for brick masonry

2.02 LADDER RUNGS FOR PRECAST CONCRETE DRAINAGE STRUCTURES:

Ladder rungs for precast drainage structures shall be constructed of copolymer polypropylene plastic, as manufactured by M.A. Industries Peachtree City, GA, or approved equal. The cost of these ladder rungs shall be included in the cubic yard unit cost for precast concrete.

PART 3 - EXECUTION

- 3.01 Install precast concrete drainage structure as shown on the drawings.

END OF SECTION

SECTION 33 41 00

DUCTILE IRON PIPE FOR STORM SEWERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. This section describes the type of ductile iron pipe to be used for storm sewers. The material shall conform to NYCDEP standard specifications. Ductile iron pipe Class 56 shall be used for storm sewers reflected on plans that are less than or equal to 12" in diameter. Storm sewers greater than or equal to 15" in diameter shall be precast reinforced concrete, Class III. Underdrain pipes that are 12" shall be Class 324420C.

1.03 STORAGE

- A. All pipes and fittings shall be stored in accordance with NYCDEP Standard Specifications.

1.04 RELATED SECTIONS

Section 33 11 17 - Filter Fabric for Utility Pipes & Manholes
Section 33 49 00 - Structures for Storm Sewers
Section 33 44 00 - Catch Basin Connections

1.05 SUBMITTALS

- A. Certification: Certificates of compliance with referenced standards.
- B. Product Data: Catalog cuts of piping and fittings.

PART 2 - PRODUCTS

2.01 MATERIAL

All material shall conform with NYCDEP standards.

- A.
 - 1. Ductile Iron Pipe shall be ceramic epoxy-lined 60-42-10 grade and Class 56 pipe conforming to the requirements of AWWA C151 and with Section 5.13 of the NYCDEP Standard Sewer Specifications.
 - 2. All joints for ductile iron pipe shall be push-on joint type meeting the requirements of ANSI Standard A21.51 or latest revision.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Conform to NYCDEP Standard Specifications.
- B. Do not place pipes until trench bottoms have been inspected and approved by the Engineer nor until trenches are free from water.

- C. All ductile iron CL56 storm sewers shall be laid on one (1) foot of broken stone bedding wrapped in filter fabric. Stone bedding shall comply with gradation specified under Specification Section 31 23 33. The trench width and the bedding widths shall be as per NYCDEP standards specified for each size of pipe.
- D. Lay all pipe true to line and grade as indicated on the Drawings and in a manner to make all surfaces at the invert and throughout the full length of the pipe aligned and smooth. Install pipes with full and uniform support, eliminate irregularities in trench bottoms by placing suitable and approved materials.

END OF SECTION

SECTION 33 41 01

FLEXIBLE PIPE CONNECTORS FOR STORM SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Provide all labor, materials and equipment necessary for the following:
 - 1. Furnish and deliver flexible pipe connectors for manholes, catch basins and drainage structures.
 - 2. Install flexible pipe connectors at all connections between pipes and sewer structures in accordance with the specifications and as directed by the Engineer.

1.03 SUBMITTAL

- A. Product Data: Submit manufacturer's catalog cut, specifications and method of installation for entering precast manholes and other concrete structures.

1.04 RELATED SECTIONS

Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 42 16 - Precast Reinforced Concrete Pipe on Concrete Cradles
Section 33 44 00 - Catch Basin Connections
Section 33 49 00 - Structures for Storm Sewers

PART 2 - PRODUCTS

- A. Connectors

The rubber connector shall meet all material and performance requirements of ASTM Standard C-923 titled, "Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes."

PART 3 - EXECUTION

3.01 METHOD

- A. The flexible connector shall be installed in accordance with manufacturer's recommendations and specifications.

Suggested manufacturers or approved equal:

ALOK Products, Inc.
P.O. Box 1647
Tullytown, PA 19007
1-800-822-ALOK

NPC, Inc ("KOR-N-SEAL")
Elm Street, P.O. Box 301
Milford, NH 03055
1-603-673-8680

END OF SECTION

SECTION 33 44 00

CATCH BASIN CONNECTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Furnish and deliver ductile iron pipe of sizes shown on the plans in accordance with the specifications.
- B. Install catch basin connections at locations shown on the plans in accordance with the specifications and to the inverts shown on the plans.

1.03 RELATED SECTIONS

Section 31 23 19 - Dewatering
Section 31 23 33 - Excavation, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 11 17 - Filter Fabric for Utility Pipes & Manholes
Section 33 49 00 - Structures for Storm Sewers

1.04 SUBMITTALS

- A. Product Data: Catalog cut of ductile iron pipe.
- B. Certification: Material certificates for crushed stone and ductile iron pipe.

PART 2 - PRODUCTS

2.01 MATERIAL

All material shall conform with NYCDEP standards.

- A. Ductile iron pipe shall be ceramic epoxy-lined 60-42-10 grade and Class 56 pipe conforming to the requirements of AWWA C151.
- B. Broken stone shall be hard, roughly cubical in shape unweathered stone uniformly graded from 1/4" to 3/4" in diameter.
- C. All joints for ductile iron pipe shall be push-on joint type meeting the requirements of ANSI Standard A21.51 or latest revision.

PART 3 - EXECUTION

3.01 EXCAVATION

- A. Excavation of pipe connections, on one (1) feet thick broken stone base.
- B. Broken stone shall be wrapped in filter fabric with minimum one (1) feet overlapping.

C. Bedding shall comply with NYCDEP Standards.

D. Concrete Encasement

Whenever minimum clearances are not maintained, the pipe shall be encased in concrete, the concrete for the full width of the encasement shall be deposited continuously to the height of the outside bottom of the pipe. Before the concrete has set, the pipe shall be evenly bedded therein and the remainder of the concrete for the encasement immediately deposited and carefully tamped in such a manner as to avoid disturbing the pipe. The concrete for encasement shall conform with NYCDEP standards.

E. Laying

1. The pipe shall be laid with male ends toward the outlet. All pipes shall be laid true to line and grade, tightly fitted together and matched so that when laid in the work they will form a drain with a smooth and uniform invert. Unless otherwise permitted or directed not less than 50 feet of piping shall be laid in one operation and the trench for each basin connection shall be fully excavated for its entire length before any pipes are laid therein.
2. During the progress of the work the interior of the connections shall be cleared of all foreign matter and the exposed ends of pipe shall be provided with temporary covers fitted to the pipe so as to exclude such materials. Dead ends of the pipe shall be closed with bulkheads of brick masonry 8 inches in thickness.

F. Joints

All joints for Ductile Iron Pipe shall be "Push-on" Joints.

G. Fitting into Masonry

1. Catch basin connections shall not enter manholes less than twelve (12) inches from any outside corner. The ends of pipes which enter masonry shall be neatly cut to fit the inner face of the masonry. When ordered such cutting shall be done before the pipes are built in.
2. Wherever the proposed connection is to connect with an existing structure in which there is a branch pipe which is damaged or of unsuitable size or in improper position, such pipe shall be removed and be replaced with a pipe of suitable size or be reset in the proper position

H. Backfilling

Immediately after the Engineer has inspected and approved the pipe laid, the trench shall be backfilled. All fill shall meet requirements of Specification 31 23 23 – Borrowed Fill for testing and compliance with Recommended Soil Cleanup Objectives (RSCO's) listed in NYCRR Part 375 Table 6.8 (b.).

END OF SECTION

SECTION 33 44 13

DRAIN BASIN WITH DOME GRATE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Under these items, the Contractor shall furnish and install DRAIN BASIN WITH DOME GRATE of the size indicated, furnished and installed in accordance with the plans, specifications, and directions of the Engineer.

1.03 SUBMITTAL

- A. Product Data: Submit material certificates and catalog cuts

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Drain basin shall be Nyloplast Drain Basin, or approved equal.
- B. Ductile iron dome grate shall be Neenah Inlet Frame and Beehive Grate, Part # R-2560-G/C, or Nyloplast Grate and Frame, Part # 1299CGD-L, as manufactured by Advanced Drainage Systems, Inc. (ADS), Hilliard, OH, or approved equal.
- C. Dome grate shall be constructed of ductile iron conforming to ASTM A536 grade 70-50-05, and shall include a locking device.
- D. Locking device: Crimped steel cable looped through grate bars attached to eyebolt set in concrete ring.
 - a. 3/16-inch (3/16") galvanized steel cable (W.W. Grainger, Inc. item no. 2TAE8 or approved equal).
 - b. Loops at ends of cable made with stainless steel sleeve and thimble set (W.W. Grainger, Inc. item no. 1DKJ9 or approved equal).
 - c. Stainless steel eyebolt, one-and-a-half-inch (1-1/2") minimum eye inside diameter, three-inch (3") shank length with washer and nut at end of shank set into concrete ring.
- E. Grate shall be factory painted black by the manufacturer.
- F. Permanent domed riser (inline drain) protection shall be included. The permanent riser protection shall be the standard ADS Product No. 6212NYFX for domed grate inlets, as manufactured by Inlet and Pipe Protection Inc. (a division of ADS, Inc.), or approved equal.

Permanent riser protection shall have the following properties (minimum):

- a. Sediment bag for 12" domed riser grate:
 - i. Clean Water Flow rate: 137 gallons per minute per square foot (gpm/sf)
 - ii. AOS: 140 (US Sieve)
 - iii. TSS Removal with Average Flow Rate of 70 GPM: 98%
- b. Frame
 - i. Stainless steel construction
 - ii. Integral lifting points

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. Drain basin shall be set to the elevations shown on the drawing and shall be connected to new drainage pipes utilizing proper fittings as recommended by the manufacturer.
- B. Broken stone should be used as the base aggregate under the drain basin. Broken Stone shall conform to the standard specification for "Broken Stone". Depth of stone base shall be as shown on the drawings. Minimum depth of broken stone below basin shall be 4".

END OF SECTION

SECTION 33 49 00

STRUCTURES FOR STORM SEWERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Construct manholes, drainage structures, cleanouts, dry wells and seepage wells, which shall be as per NYCDEP standard drawings and specifications.
- B. Construct inlets which shall be as per NYCDEP standard drawings and specifications.
- C. Construct catch basins which shall be as per NYCDEP standard drawings and specifications.
- D. Furnish and install precast flared end reinforced concrete pipe sections, frames, grates and covers for sewer structures in accordance with contract documents.
- E. Structure shall be placed on concrete cradle if connecting pipe is on cradle.

1.03 SUBMITTAL

- A. Mix Design: Submit design mix report and material certificates for concrete and mortar mixes.
- B. Product Data: Submit for admixtures, curing compounds and reinforcement.
- C. Certification: Submit material certificates and catalog cuts for frames, grates and covers.
- D. Shop Drawing: Should the Contractor propose, as an alternate, the use of pre-cast structures, submit shop drawings and material certificates of such structures.

1.04 RELATED SECTIONS

Section 31 23 00 - Earthwork, Unclassified Excavation
Section 31 23 33 - Excavation, Backfilling and Compaction for Pipes and Utility Trenches
Section 33 41 00 - Ductile Iron Pipe for Storm Sewers
Section 33 42 16 - Precast Reinforced Concrete Pipe on Concrete Cradles
Section 33 44 00 - Catch Basin Connections

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete shall comply with NYCDEP standards and Standard Sewer Specification Section 2.15 for Class 40 concrete; Type II Portland Cement; Type 3 Fine Aggregate and Type 1, Size No. 7 course aggregate.
- B. Steel reinforcement shall comply with the requirements of ASTM A615, Grade 60, Billet Steel Bars for Concrete Reinforcement.

- C. Gray iron castings shall be Class No. 35B, ASTM A 48.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. The drainage structure installation or construction includes excavation, construction, backfilling and restoration of the pavement or ground as shown on the plans in accordance with NYCDEP specifications and standard drawings.

END OF SECTION

SECTION 33 49 10

COVERS AND FRAMES FOR DEP MANHOLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION

- A. Furnish and install manhole covers and frames which shall be as per NYCDEP standard drawings and specifications and in accordance with Contract Documents.
- B. This section describes Gray Iron and Malleable Iron Castings in the borough in which the work is being performed for sewers and appurtenances.
- C. Gray Iron and malleable iron are not to be used for valves, cast iron pipe or castings subject to high temperatures.

1.03 RELATED SECTIONS

Section 33 49 00 - Structures for Storm Sewers

1.04 SUBMITTALS

- A. Product Data: Submit material certificates and catalog cuts for frames, grates and covers.

PART 2 PRODUCTS

2.01 Materials

- A. Gray iron castings shall be Class No. 35B, ASTM A 48, as per NYCDEP specifications and standard drawings.

PART 3 EXECUTION

3.01 METHOD

- A. The Covers shall be installed on frames as shown on the contract drawings and per NYCDEP standard details and specifications. Immediately prior to the final inspection the Contractor shall clean cover surfaces that show evidence of loose mill scale, non-adherent rust, peeling paint and other deleterious matter in accordance with SP-2, Hand Tool Cleaning, a method generally confined to wirebrushing, sandpaper, hand scrapers or hand impact tools.

END OF SECTION

SECTION 34 01 13

MAINTENANCE AND PROTECTION OF TRAFFIC

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1-General Requirements, apply to the work of this Section.
- B. References:
 - NYCDOT Bureau of Traffic Regulation Manual on Temporary Traffic Control by Street Barricades and Channelization.
 - Manual on Uniform Traffic Control Devices (MUTCD).
 - Standard NYCDOT Highway Specifications (NYCDOTSS).
 - Standard NYSDOT Specifications - Construction and Materials, dated May 1, 2008, Section 619 (NYSDOTSS).

1.02 DESCRIPTION

- A. The scope of this section is to maintain and protect vehicular, bicycle, and pedestrian traffic by segregating the public from construction activities and work zones.
- B. The provisions of Sections 1.06.44 and 6.70 Maintenance and Protection of Traffic of the NYCDOT Highway Specifications shall apply.

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

- A. The Contractor shall provide all traffic control devices such as traffic cones, flashing arrow boards, warning signs, fencing, temporary concrete barriers and directional signage for pedestrians, etc. as specified and shown on the plans or required to control the work area.

Timber curb, plastic barrels, lighted Type III breakaway barricades and construction signs shall be in accordance with NYCDOT Highway Specification Sections 6.25 RS, 6.26, 6.28 BA, 6.59P and 6.87.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall prepare a maintenance of traffic plan for all work operations for approval by NYCDOT and the Owner's representative.
- B. Maintenance of traffic shall receive the full attention of the Contractor. All operations shall be

conducted to keep interference with all traffic at a minimum and to maintain the safety of all concerned.

- C. The Contractor shall notify the New York City Office of Construction Mitigation and Coordination and the Bureau of Traffic Operations at least 30 calendar days before starting construction.
- D. Furnish, install, relocate, maintain and remove all traffic control devices required to maintain and protect traffic during periods of construction as shown on the plans.
- E. All maintenance and protection work and control devices shall conform to applicable sections of the MUTCD, NYCDOTSS, NYSDOTSS and with NYCDOT Regulation Manual on Temporary Traffic Control by Street Barricades and Channelization.
- F. If the approved plan is not strictly adhered to, the Owner has the right to direct that any affected work be immediately discontinued. Such work shall not be resumed until the owner is assured and determines that the work will be performed in conformity with the approved plan. The Contractor shall have no claim against the owner for losses or delays caused by such stoppages of work.
- G. Place temporary pavement markings and remove same when directed by the Owners representative per NYCDOT Highway Specification Section 6.49.
- H. If at any time conditions warrant modifications to procedures included herein, the Contractor shall perform the modifications as ordered by the Owner's representative.

3.02 MAINTENANCE

- A. The Contractor shall maintain and be responsible for all devices and equipment for the duration of the work.
- B. It is the responsibility of the Contractor to ensure that all traffic control devices are maintained in their proper locations at all times.
- C. All construction signs shall be covered when the work they pertain to is not in progress and removed when the work they pertain to is completed.
- D. Travel lanes shall be swept clean of debris and all ice and snow must be removed before the lane is reopened to traffic.

3.3 TEMPORARY RESTORATION OF PAVEMENTS

- A. Immediately after trench backfill and soil compaction operations, the Contractor shall temporarily restore all sidewalk and street surfaces affected with a 4" thick asphaltic concrete binder base paving course on a 6" broken stone sub-base, to maintain traffic as directed. Materials shall comply with NYCDOT Standards and Specification.

END OF SECTION