APPENDIX F

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS
FOR
EXCAVATION AND CAPPING OF THE FILLED FIRST STREET TURNING BASIN
GOWANUS CANAL

DIVISION 01 – GENERAL REQUIREMENTS

01 11 00	Summary of Work
01 32 01	Construction Progress Documentation
01 33 00	Submittal Procedures
01 35 29.13	Health, Safety, and Emergency Response Procedures for Contaminated Sites
01 41 00	Regulatory Requirements
01 51 00	Temporary Utilities
01 52 13	Temporary Field Offices and Structures
01 52 16	First Aid Facilities
01 55 29	Staging Areas
01 57 13	Temporary Erosion and Sediment Control
01 57 19	Temporary Environmental Controls
01 71 23.16	Construction Surveying
01 78 00	Contractor Closeout Submittals

DIVISION 02 – EXISTING CONDITIONS

02 51 00	Decontamination
02 51 19	Excavated Material and Waste Management

DIVISION 03 – CONCRETE

03 11 13	Cast-in-Place Concrete Formwork
03 21 00	Reinforcing Steel
03 30 00	Cast-in-Place Concrete
03 37 26	Underwater Placed Concrete

DIVISION 05 – METALS

05 05 13.1	Galvanizing
05 12 34	Structural Steel Permanent Lateral Bracing

DIVISION 09 – FINISHES

09 96 56	Epoxy Coatings

DIVISION 31 – EARTHWORK

31 09 13 Geotechnical Instrumentation and Monitoring
31 10 00 Site Preparation
31 23 16 Excavation
31 53 01 Lateral Bracing for Excavation
31 63 34 Drilled Steel Pipe Piles

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 31 13 Chain Link Fences
32 31 24 Waterfowl Barrier
32 91 13 Planting Soils
32 91 16 Planting Soil Stabilization
32 93 01 Intertidal Vegetation

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION

35 43 00 Cap Construction

DIVISION 44 – POLLUTION AND WASTE CONTROL EQUIPMENT

44 08 40 Water Treatment System Requirements

SECTION 01 11 00

SUMMARY OF WORK

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. As included in the 100% Design Report, the Work includes installation of excavation support systems and excavation for the installation of a capped turning basin with an intertidal vegetative shelf. The excavation support walls will be incorporated into the permanent bulkheads for the excavated basin. The base of the excavation will include an environmental cap.

B. Location

1. The Work is located between Carroll Street, 3rd Avenue, 2rd Street, and the Gowanus Canal; generally at the terminus of 1st Street, as indicated on the Construction Drawings.

C. Responsible Parties

1. The person, persons, or firm identified by the United States Environmental Protection Agency (EPA) as responsible for implementing the Work.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES (NOT USED)

1.4 SUMMARY OF WORK

A. The Contractor shall provide plans, equipment, materials, and labor to satisfactorily perform the Work required to complete construction. The conceptual sequence of construction activities are provided below.

1. Planning and Administration

a. The Contractor shall:

1. Familiarize himself or herself with the Site, the Work, and Technical Specifications;

2. Prepare a schedule to be included in the bid documents, which includes the proposed sequence of operations, as outlined in Section 01 32 01 – Construction Progress Documentation;

3. Attend the pre-construction Site walk;

4. Prepare a Site-specific Health and Safety Plan;

5. Prepare and obtain approvals from the Engineer and EPA for Plans and Submittals required in Section 01 33 00 – Submittal Procedures;

6. Obtain all necessary Federal, State, and local permits, licenses, and approvals in accordance with Section 01 41 00 – Regulatory Requirements; and

7. Confirm with the Engineer that all access agreements are in-place and that any vehicles, trailers, or large pieces of equipment debris have been removed from the Site and/or Staging Site.

2. Pre-Construction Activities

   a. The Contractor shall:

      1. Notify the Engineer and EPA of the intended start date for construction activities;

      2. Install erosion control measures in accordance with Section 01 57 13 – Temporary Erosion and Sediment Control and the Construction Drawings;

      3. Mobilize equipment to the Site and Staging Site;

      4. Prepare Staging Site, including supporting barges on the Gowanus Canal adjacent to the Site, to support remedial activities and water treatment, including installing temporary utilities as needed and as indicated in Section 01 41 00 – Regulatory Requirements, Section 01 51 00 – Temporary Utilities, Section 31 10 00 – Site Preparation, Section 44 08 40 – Water Treatment System Requirements, and the Construction Drawings;

      5. Responsible for Site security and maintain Site gate access control throughout the Work as specified in Section 31 10 00 – Site Preparation;

      6. Coordinate activities of suppliers and subcontractors performing or supplying materials for the Work. Work performed by subcontractors for the Contractor shall be the responsibility of the Contractor. Products will be in accordance with the Technical Specifications;

      7. Conduct survey of underground utility locations, including notifying the underground facilities protection organization for a Code 753 utility mark-out a minimum of three (3) days prior to any excavation activities;

      8. Install, maintain, and protect temporary utilities in accordance with Section 01 51 00 – Temporary Utilities;

      9. Complete Baseline Building Conditions Assessments, according to Section 31 09 13 – Geotechnical Instrumentation and Monitoring; and

      10. Establish means of, and techniques and procedures for, constructing and otherwise executing the project. Construction activities may not commence without approvals by the Engineer and EPA.

3. Construction Activities

   a. The Contractor shall:

      1. Start, construct, and complete the project in accordance with the approved Plans, Technical Specifications, and Construction Drawings;

      2. Install and maintain an instrument and monitoring plan in accordance with Section 31 09 13 – Geotechnical Instrumentation and Monitoring;

      3. Environmental controls and contingency plans shall be implemented according to the results of monitoring performed by other parties, as described in Section 01 57 19 – Temporary Environmental Controls. Monitoring performed by others includes, but is not limited to, community air monitoring, noise monitoring, and

vibration monitoring. Vibration and noise monitoring are the responsibility of the Contractor, including costs, while air monitoring will be the responsibility of the Engineer;

4. Maintain order, safe practices, and proper conduct at all times among the Contractor's, and any subcontractor's, employees in accordance with Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites. The Engineer and EPA maintains Stop Work Authority for the duration of the Work;
5. Manage cultural resources in accordance with Section 02 51 19 – Excavated Material and Waste Management and the Construction Drawings;
6. Install excavation support systems and permanent bulkheads in accordance with the Technical Specifications and the Construction Drawings;
7. Perform excavation in accordance with Section 31 23 16 – Excavation and the Construction Drawings;
8. Manage, clean, transport, and dispose of debris collected during excavation in accordance with Section 02 51 19 – Excavated Material and Waste Management;
9. Any water shall be transported to the Water Treatment System for treatment and discharge in accordance with Section 02 51 19 – Excavated Material and Waste Management and Section 44 08 40 – Water Treatment System Requirements;
10. Solidify/stabilize, if necessary, and transport and dispose excavated material in accordance with Section 02 51 19 – Excavated Material and Waste Management;
11. Cap excavated areas in accordance with Section 35 43 00 – Cap Construction and the Construction Drawings, and complete post-excavation backfill in accordance with the Construction Drawings;
12. Conduct required progress surveys in accordance with Section 35 43 00 – Cap Construction and Section 01 71 23.16 – Construction Surveying;
13. Plant vegetation within the intertidal vegetative shelf in accordance with Section 32 91 13 – Planting Soils, Section 32 91 16 – Planting Soil Stabilization, and Section 32 93 01 – Intertidal Vegetation;
14. Install waterfowl barrier in accordance with Section 32 31 24 – Waterfowl Barrier; and
15. Install fence in accordance with Section 32 31 13 – Chain Link Fences.

4. Post-Construction Activities
   a. The Contractor shall:
      1. Repair damages to any existing features in the Gowanus Canal, on the Staging Site, or any adjacent properties caused by the Contractor or associated subcontractor(s) at no additional cost to the Responsible Parties;
      2. Conduct photographic survey at low tide of the bulkheads;
      3. Conduct post-construction building condition assessments in accordance with Section 31 09 13 – Geotechnical Instrumentation and Monitoring;

4. Conduct final cap survey in accordance with Section 01 71 23.16 – Construction Surveying and Section 35 43 00 – Cap Construction;

5. Conduct final Site inspection and project close-out activities in accordance with Section 01 78 00 – Contractor Closeout Submittals;

6. Remove from the Site all equipment, trailers and other appurtenances which may have been brought to the Site; and

7. Remove or dispose of unused materials from the Site in accordance with Section 02 51 19 – Excavated Material and Waste Management.

5. Maintain asphalt pad, drainage features, utilities, access roads, signs, and gates at the Staging Site until acceptance of construction by the Engineer. The Contractor is required to maintain Site gate access control (i.e., staff guard booths) for the duration of the Work.

6. Remove, transport, and dispose of materials and debris associated with erosion controls in accordance with Section 02 51 19 – Excavated Material and Waste Management and as directed by the Engineer.

7. Restore Staging Site to pre-construction conditions in accordance with Section 01 78 00 – Contractor Closeout Submittals.

1.5 CONTRACTOR USE OF SITE

A. The Contractor shall confine operations at the Site to those areas permitted by laws, ordinances, and permits.

B. When determining the amount, location, movement, and use of materials and equipment on the Gowanus Canal or on the Staging Site, the Contractor shall consider the safety of performing the Work and the safety of people and property adjacent to the Work activities.

C. The Contractor shall conduct the Work in a clean and orderly manner.

D. Heavy equipment noise-producing work may occur between the hours of 7:00 AM and 6:00 PM local time on weekdays, unless otherwise authorized in accordance with Section 01 57 19 – Temporary Environmental Controls.

E. The Contractor shall minimize impact on vessel traffic, coordinating with other vessel operators, throughout the Canal in accordance with Section 01 41 00 – Regulatory Requirements.

F. Parking and vehicular access shall be in accordance with Section 31 10 00 – Site Preparation.

G. The Contractor shall coordinate the Work with the Engineer and any other parties on the Site. The Engineer shall provide points of contact for coordination with other parties to the Contractor.

1.6 DESIGN CLARIFICATIONS AND CHANGES

A. During the course of the Work, clarifications and changes to the design may be necessary to advance the Work. Clarifications of the design will be resolved through the use of Requests for Information (RFIs) submitted to the Engineer. If conflicts within the Construction Drawings and/or Technical Specifications are discovered by the Contractor, the Contractor will submit an RFI to the Engineer, who will be responsible for receiving, distributing, and tracking RFIs. The Engineer may:

1. Respond with clarification of the design intent (i.e., expounding upon an existing and approved design concept) and return the completed RFI to the Contractor for distribution; or

2. Determine that an alteration to the design is warranted and issue a Design Change Notice (DCN) for review and approval by the Responsible Parties and EPA. Approved DCNs will be forwarded to the Engineer for distribution.

1.7 HEALTH AND SAFETY REQUIREMENTS

A. The Contractor shall comply with environmental health and safety/training requirements in accordance with the approved Construction Health and Safety Plan and Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

1.8 CONTROL OF THE WORK

A. The Engineer will address all questions that may arise as to the quality and acceptability of the Work and as to the rate of progress of the Work, all questions that may arise as to the interpretation of the Technical Specifications, and all questions as to compensation. All questions that affect any of the above must be submitted in writing. Verbal interpretations will not be interpreted as official changes to the design and will not be accepted as potential changes to compensation.

B. All questions as to the interpretation of the Technical Specifications and the Work shall be submitted to the Engineer in writing. The Engineer and EPA have the authority to suspend the Work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the workers or the general public, failure to meet permit requirements, failure to comply with regulatory requirements, failure to meet the demands of the Construction Drawings and Technical Specifications. The Responsible Parties may suspend partial payments for these reasons and shall not be responsible for stand-by costs to the extent work is suspended for these reasons.

C. The Engineer and EPA may also suspend the Work wholly or in part for such periods as deemed necessary due to unsuitable weather, for conditions considered unsuitable for the prosecution of the Work, or for any other condition or reason deemed to be in the public interest.

D. Certain project elements may be subject to Special Inspection to be performed by others. The Contractor shall cooperate with and provide safe access to the Special Inspector at all times for the performance of the inspections.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 32 01

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section summarizes the Contractor's progress reporting requirements, including Daily, Weekly, and Monthly Progress Reports and schedules.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES

A. The following reference is used in this Section:

1. United States Environmental Protection Agency (EPA), August 2016. EPA Region 2 Clean and Green Policy: Touchstone Practices and Metrics.

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer in accordance with Section 01 33 00 – Submittal Procedures:

1. The Contractor's Construction Schedule.

a. The Contractor shall not start activities at the Site or Staging Site until the Contractor's Construction Schedule has been reviewed and approved by the Engineer and EPA.

2. Daily Progress Reports. The Contractor shall submit Daily Progress Reports to the Engineer by 5:00 PM on the business day following the reporting day, unless an alternative timeframe is approved by the Engineer. Daily Progress Reports shall include, at minimum, the following information.

a. Daily Progress Report number.

b. Date.

c. Weather.

d. On-site subcontractors (if applicable).

e. Hours of Work, including any downtime and delays.

f. Brief description of the Work performed.

g. Health and safety update, including any near misses or incidents.

h. Community air monitoring update, including reporting of any vapor, particulate, or odor exceedances or complaints and mitigation measures implemented.

i. Decontamination Status Report:

1) Description of the decontamination status for each equipment, including whether it has come in contact with impacted materials; and

2) Whether the status of a piece of equipment has changed from handling impacted materials to non-impacted materials.

j. Notes regarding any construction discrepancies, field alterations, deficiencies, and any proposed remedial action.

k. Reference and description of any circumstances that may lead to a contractual issue or question (i.e. differing Site condition, etc.).

l. Quantities of any materials delivered.

m. Quantities and identification of steel pipe piling installed and tip elevations.

n. Installation progress for steel piles, and type of testing performed.

o. Estimated area capped, estimated volume placed, and comparison to estimate.

p. Documentation of excavation progress performed in accordance with Section 31 23 16 – Excavation, including the following information:

1) Location of excavation;

2) Estimated daily and cumulative excavation volume;

3) Variance from projected total excavation volume;

4) Brief description of products or materials inspected;

5) Brief description of quality control activities or inspections of the Work and the outcome of those activities/inspections;

6) Brief description of surveys performed;

7) Brief description of communications received by the Engineer;

8) A list of equipment located on the Site or at the Staging Site, including equipment type, maintenance performed, and hours of downtime due to equipment malfunction;

9) A daily log of weights of material transported off-site for disposal, organized by waste type and disposal facility; and

10) Any other comments.

q. Documentation of cap construction progress performed in accordance with Section 35 43 00 – Cap Construction, including the following information:

1) Location of capping;

2) Estimated daily and cumulative capping volume (reported by material type);

3) Variance from projected total capping volume (reported by material type);

4) Brief description of products or materials inspected;

5) Brief description of quality control activities or inspections of the Work and the outcome of those activities/inspections;

6) Brief description of surveys performed;

7) Brief description of communications received by the Engineer;

8) A list of equipment located on the Site or at the Staging Site, including equipment type, maintenance performed, and hours of downtime due to equipment malfunction; and

9) Any other comments.

3. Draft Weekly Progress Reports. The Contractor shall submit Weekly Progress Reports marked as "DRAFT" to the Engineer by 5:00 PM on the Monday following the reporting week, unless an alternative timeframe is approved by the Engineer. The Weekly Report shall include, at a minimum, the following information.

   a. Weekly Progress Report number.

   b. Dates worked.

   c. Weather.

   d. Subcontractors (if applicable), including a list of equipment and crewmembers on-site.

   e. Hours of work, including downtime and delays.

   f. Description of the Work performed with accompanying photographs.

   g. Health and safety update, including any near misses or incidents.

   h. A list of deviations from the drawings or specifications.

   i. A list of deviations from the estimate and potential implications for completing the balance of the Work.

   j. Details of any delays that may impact the schedule and areas that need improvement.

   k. A list of problem areas (i.e., areas that the Contractor is having difficulties completing, where delays are encountered, or where the Work that has been completed is deficient) and solutions.

   l. Narrative status of planned activities compared with the planned and updated Project Schedule.

   m. Updated Project Schedule.

   n. Actions taken to address any design or construction issues.

   o. List of activities to be completed in the coming two weeks.

   p. Documentation of excavation progress performed in accordance with Section 31 23 16 – Excavation, including the following information:

      1) Estimated volume excavated during the week;

      2) Weekly production rate and comparison to estimate; and

      3) A table depicting the number of scows loaded, and the cumulative volume or weight of material excavated and removed from the Site.

q. Documentation of capping progress performed in accordance with Section 35 43 00 – Cap Construction, including the following information:

1) Estimated area capped during the week and locations over which capping materials were placed (reported by material type);

2) Estimated volume placed and comparison to estimate (reported by material type);

3) Quantities of each capping materials received (e.g., sand, oleophilic clay, granular activated carbon, aggregate, top soil);

4) Quantities of capping materials mixed and prepared;

5) Quantities of each capping material placed (e.g., sand, oleophilic clay, granular activated carbon, aggregate, top soil);

6) Cap quality control measurements; and

7) Planting materials delivered and installed.

4. Final Weekly Progress Reports. The Engineer will review the Draft Weekly Reports within three business days following receipt. Within two business days following receipt of any revisions, the Contractor shall submit Final Weekly Progress Reports that incorporate any revisions based on Engineer's review of the Draft Weekly Reports.

5. Monthly Progress Reports. The Contractor shall submit Monthly Progress Reports to the Engineer one week following the conclusion of the reporting period. Monthly Progress Report shall include, but are not limited to, the following information as it applies to that month's work:

a. Electricity Usage (EPA, 2016):

1) Usage in kilowatt-hours;

2) Sources of electricity used on the Site or at the Staging Site; and

3) The Contractor shall enter data using EPA's Power Profiler[1] and report the results.

b. Project Fleet information as follows (EPA, 2016):

1) Number of vehicles in fleet;

2) Vehicle/equipment type, sector, application, horsepower rating, model, year, fuel type and monthly usage;

3) Fleet usage rate (hours/vehicle/month);

4) Number of vehicles that have been retrofitted and with what technology since originally manufactured; and

5) The Contractor shall enter data into EPA's Diesel Emissions Quantifier[2] and report the results.

[1] https://oaspub.epa.gov/powpro/ept_pack.charts

[2] https://cfpub.epa.gov/quantifier/index.cfm?action=main.home

c. Data regarding material reduction and material reuse/recycling, as follows (EPA, 2016):

1) Tons and type of materials reduced through purchase of products made from recycled materials;

2) Materials reused or recycled by tons and type of materials; and

3) The Contractor shall enter data into EPA's Waste Reduction Model[1] and Recycled Content Tool[2] and report the results.

d. Geotechnical Instrumentation and Monitoring:

1) Pre-Construction Survey(s);

2) Construction monitoring, including vibration and movement monitoring data; and

3) Post-Construction Surveys.

1.5 CONSTRUCTION SCHEDULE

A. FORMAT

1. Schedules shall be developed for use by the Engineer in the form of Critical Path Method charts, using Microsoft Project (or equivalent scheduling software) with the characteristics listed below.

a. Each major task shall be represented. Significant subtasks (including preparation of submittals) shall be clearly indicated.

b. The minimum page size shall be 11 x 17 inches.

c. Tasks shall be listed in chronological order.

d. Predecessor and successor relationships shall be linked as necessary.

e. The critical path shall be clearly indicated.

B. CONTENT

1. The schedule shall indicate:

a. The sequence of work;

b. The dates for the beginning and completion of each task and the sequence of subtasks. The durations associated with each task shall not exceed the durations provided in the estimated construction schedule, included as a Gantt Chart, in Appendix M of the 100% Design Report;

c. Any anticipated delays or decisions outside of the Contractor's control;

d. The estimated percent completion for each task; and

e. Interim milestone dates that the Contractor requires to track and manage progress.

[1] https://www.epa.gov/warm

[2] https://19january2017snapshot.epa.gov/www3/epawaste/conserve/tools/warm/ReCon_Online.html

C. REVISIONS

1. Revisions to the schedule shall include the following.
    a. Revision shall be against the baseline schedule approved by the Owner's Representative.
    b. Changes occurring since the previous schedule submission, including:
        1) Major changes in scope;
        2) Activities modified since previous submission;
        3) Revised projections of progress and completion;
        4) Number of anticipated delay days; and
        5) Other identifiable changes.
    c. Supporting narrative, as needed, to define:
        1) Problems, anticipated delays, and impacts on the schedule;
        2) Recommended equipment, manpower, or resequencing that will be used to complete the project in the approved timeframe if a critical path or interim milestone is missed; and
        3) Effect of changes on schedules of other contractors.
    d. A recovery schedule if the critical path is affected.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. Where required by the Technical Specifications, the Contractor shall submit descriptive information that will enable the Engineer and EPA to determine whether the Contractor's proposed materials, equipment, and methods are in general conformance with the design concept and in accordance with the Construction Drawings and Technical Specifications. The information submitted may consist of drawings, specifications, descriptive data, certificates, samples, test results, product data, and such other information, all as specifically required in the Construction Drawings and Technical Specifications.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES (NOT USED)

1.4 SUBMITTALS

A. The full list of submittals required by the Contractor is provided in Table 1 at the conclusion of this Section.

B. Submittals shall be organized into the following categories and shall include, but are not limited to the following.

1. Administrative:

a. Meeting agendas;

b. Construction Schedule;

c. Daily/Weekly Progress Reports;

d. Schedule of Values;

e. Project photographs and videos;

f. Project Record Documents (including survey files); and

g. Warranties and guarantees on the Work, equipment, and facilities.

2. Technical:

a. Manufacturer's specifications;

b. Engineering certifications;

c. Import material sample results; and

d. Catalogs, or parts thereof, of manufactured equipment.

3. Contractor Work Plans:

   a. Operations Plan: the Contractor shall prepare an Operations Plan that presents the Contractor's detailed approach for implementing the required work activities. The Operations Plan shall include, at a minimum, details related to the following.

      1) Construction operations:

         a) The tasks and objectives of the Site operations and the logistics and resources required to achieve those tasks and objectives;

         b) A narrative of the anticipated construction activities and potential sequencing as well as the Contractor's normal operating procedures;

         c) The personnel and equipment requirements for implementing the Operations Plan; and

         d) Support Area Layout and Construction.

      2) An Erosion and Sedimentation Control Plan describing the means and methods, and control measure layout/specifications, to achieve the standards set forth in Section 01 57 13 – Temporary Erosion and Sediment Control

      3) The Operations Plan shall also include, at a minimum, the following as separate submittals:

         a) Health and Safety Plan;

         b) Site Preparation Work Plan;

         c) Temporary Utilities Plan;

         d) Quality Assurance Project Plan;

         e) Construction Noise Mitigation Plan;

         f) Construction Air Emissions and Odor Control Plan;

         g) Water Quality Control Plan;

         h) Dust Control Plan;

         i) Spill Prevention and Control Plan;

         j) Materials Management Plan;

         k) Waste Management Work Plan;

         l) Transportation Plan;

         m) Geotechnical Monitoring and Instrumentation Plan;

         n) Excavation Work Plan;

         o) Capping Plan;

         p) Chain Link Fence Plan;

         q) Water Treatment and Management Plan;

         r) Planting Soil Plan;

         s) Intertidal Vegetation Plan; and

         t) Waterfowl Protection Plan.

4. Transport and Waste Profile:

    a. Weight tickets;

    b. Waste profile sampling results; and

    c. Transportation manifests.

1.5 SUBMITTAL QUALITY

A. Submittals shall be in the English language.

B. Submittals shall be electronic and provided in both Microsoft Office® document format and in Portable Document Format (PDF). Engineering Drawings and surveys shall be provided in AutoCAD® format [.dwg (2016 or later)] and as a PDF.

C. The Contractor shall maintain electronic copies of all submittals for 1 year following the completion of the Work. Submittals shall be reproducible to yield legible hard copies.

D. Submittals shall be completed with respect to design criteria and other information specified to enable the Engineer and/or EPA to review the information effectively.

E. Submittals requiring EPA review and approval must be submitted no less than 30 days prior to the proposed start of the work.

1.6 DEVIATIONS

A. At the time of the submission, the Contractor shall give notice in writing in the submittal of any deviation from the requirements of the Technical Specifications and remedial design. The deviations shall be clearly indicated or described.

B. The Contractor shall state, in writing, variations in costs occasioned by the deviations and an assumption of the costs of related changes, if the deviation is approved.

1.7 SUBMITTAL PROCEDURES

A. All submittals shall be directed to the Engineer, who will then forward to EPA, unless otherwise specified.

B. Transmittal of Submittal

1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall ensure that the material, equipment, and the Work method are accurately described.

    a. The Contractor shall verify that all features of all products conform to the requirements of the Construction Drawings and Technical Specifications.

    b. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where its submittal may affect the Work.

    c. The Contractor shall ensure coordination of submittals among the Subcontractor(s).

C. Submittal Identification shall include the following.

1. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted.

2. Original submittal numbers shall have the following format: “XXX-Y”; where “XXX” is the originally assigned submittal number and “Y” is a sequential letter assigned for

resubmittals (for example, A, B, or C being the first, second, and third resubmittals, respectively). Submittal 1B, for example, is the second resubmittal of Submittal 1.

3. Date of transmittal.

4. Names of the Contractor, subcontractor, supplier, and manufacturer, as appropriate.

5. Resubmittals: Clearly identify each correction or change made.

D. No construction materials or activities represented by required submittals shall be purchased or shall commence until the applicable submittal has been reviewed and approved, unless explicitly stated otherwise in writing by the Engineer.

1.8 SUBMITTAL REVIEW

A. Review Time

1. The Contractor shall assume submittals will be reviewed within 10 calendar days.

2. The Contractor shall assume submittals requiring regulatory review will be reviewed within 30 calendar days. The Engineer will coordinate the review of submittals with EPA.

3. Review of submittals by the Engineer and/or EPA shall not cause a delay in the implementation of the Work. The Contractor shall provide review time within the Project Schedule that will allow for review of draft and final submittals.

4. Extension of the time for performance of the Work will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.

B. The returned submittal will indicate one of the following:

1. Conforms. If the review determines that the material, equipment, or the Work method complies with the Construction Drawings and Technical Specifications, the submittal will be marked "Conforms."

2. Conforms as Noted. If the review indicates that the submittal is conditionally accepted, the submittal will be marked "Conforms as Noted."

3. Revise and Resubmit. If the review indicates that the submittal is insufficient or contains incorrect data, the submittal will be marked "Revise and Resubmit."

4. Rejected. If the review indicates that the material, equipment, or the Work method does not comply with the Construction Drawings and Technical Specifications, the submittal will be marked "Rejected." Additionally, submittals with deviations that have not been identified clearly may be rejected.

5. Informational Submittal Only. In some cases, approval by the Engineer is not required. In this case the submittal may be marked "Informational Submittal Only."

C. Approval of submittals shall not relieve the Contractor of responsibility for errors or omissions in the submittals or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the activities provided for by the submittals.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

Table 1
List of Submittals

Section	Section Name	Submittal Title	Deadline
01 32 01	Construction Progress Documentation	Bid Construction Schedule	With Bid Documents
01 32 01	Construction Progress Documentation	Updated Construction Schedule	14 calendar days prior to pre-construction meeting
01 32 01	Construction Progress Documentation	Final Construction Schedule	7 calendar days prior to pre-construction meeting
01 32 01	Construction Progress Documentation	Construction Progress Schedules	Weekly
01 32 01	Construction Progress Documentation	Daily Progress Reports	Daily
01 32 01	Construction Progress Documentation	Weekly Progress Reports	Weekly
01 32 01	Construction Progress Documentation	Monthly Progress Reports	Monthly
01 33 00	Submittal Procedures	Operations Plan	Not less than 30 Days prior to Mobilization.
01 33 00	Submittal Procedures	Erosion and Sedimentation Control Plan	Not less than 30 Days prior to Mobilization.
01 35 29.13	Health, Safety, and Emergency Response Procedures for Contaminated Sites	Draft Site-Specific Contractor HASP (CHASP) (including resumes and training records)	The Sooner of: 7 days prior to pre-construction meeting, or 30 days prior to mobilization
01 35 29.13	Health, Safety, and Emergency Response Procedures for Contaminated Sites	Final Site-Specific Contractor CHASP (including resumes and training records)	7 Calendar Days After Receipt of Draft CHASP Comments
01 41 00	Regulatory Requirements	Copies of Local, County or Municipal Permits	30 Calendar Days Prior to Start of the Work
01 51 00	Temporary Utilities	Temporary Utilities Plan	30 Calendar Days After Notice to Proceed
01 52 13	Temporary Field Offices and Structures	Field Office	With Bid
01 55 29	Staging Areas	Material Staging and Transport Work Plan	Not less than 30 days Prior to Starting the Work
01 57 13	Temporary Erosion	Manufacturer's Product Data	As needed
01 57 13	Temporary Erosion	Weekly inspection forms	Weekly
01 57 13	Temporary Erosion	Completed Checklists and Certificates	As Applicable with Progress Reports
01 57 19	Temporary Environmental Controls	Construction Noise Mitigation Plan	With Bid
01 57 19	Temporary Environmental Controls	Construction Air Emissions and Odor Control Plan	With Bid

Table 1
List of Submittals

Section	Section Name	Submittal Title	Deadline
01 57 19	Temporary Environmental Controls	Water Quality Control Plan	With Bid
01 57 19	Temporary Environmental Controls	Dust Control Plan	With Bid
01 57 19	Temporary Environmental Controls	Spill Prevention and Control Plan	With Bid
01 71 23.16	Construction Surveying	Survey Plan	Not less than 30 days Prior to Starting the Work
01 71 23.16	Construction Surveying	Surveyor's Calibration Documentation and Notes	As Applicable with Progress Reports
01 71 23.16	Construction Surveying	Survey Data Files	As Requested
01 71 23.16	Construction Surveying	Surveyor's License	As Applicable with Progress Reports
01 71 23.16	Construction Surveying	Initial Record Survey Drawings	Prior to Earthmoving
01 71 23.16	Construction Surveying	Progress Record Survey Drawings	Within 7 days After Survey
01 71 23.16	Construction Surveying	Final Record Drawings	Prior to Final Acceptance of Project by the Responsible Parties
01 78 00	Contractor Closeout Submittals	Signed Warranties and Certifications	Prior to Final Payment Request
01 78 00	Contractor Closeout Submittals	Work Photographs and Videos	Prior to Final Payment Request
01 78 00	Contractor Closeout Submittals	Project Closeout Drawings	Prior to Final Payment Request
01 78 00	Contractor Closeout Submittals	Record Documents	Prior to Final Payment Request
01 78 00	Contractor Closeout Submittals	Maintenance/Operation Manuals	Prior to Final Payment Request
01 78 00	Contractor Closeout Submittals	Final Payment Request	Following Approval of Above Closeout Submittals
02 51 00	Decontamination	Decontamination Work Plan	With Bid
02 51 00	Decontamination	Equipment Decontamination Documentation Report and Certification	Prior to Demobilization of Any Equipment that has Contacted Impacted Materials
02 51 00	Decontamination	Safety Data Sheets	A Minimum of 14 days Prior to the Cleaning/ Decontamination Solution Being Brought On-site
02 51 00	Decontamination	Daily Progress Reports	Daily

Table 1
List of Submittals

Section	Section Name	Submittal Title	Deadline
02 51 19	Excavated Material and Waste Management	Materials Management Plan	Not less than 30 days Prior to Starting the Work
02 51 19	Excavated Material and Waste Management	Waste Management Work Plan	Not less than 30 days Prior to Starting the Work
02 51 19	Excavated Material and Waste Management	Transportation Plan	Not less than 30 days Prior to Starting the Work
02 51 19	Excavated Material and Waste Management	Quality Assurance Project Plan	Not less than 30 days Prior to Starting the Work
02 51 19	Excavated Material and Waste Management	Transport and Waste Profiles	Not less than 30 days Prior to Starting the Work
05 12 34	Structural Steel	Working Drawings, Shop Drawings, and Material Specifications, etc.	Not less than 30 Days Prior to Starting the Work
09 96 56	Epoxy Coatings	Catalog Cuts and Reference Materials	Not less than 30 Days Prior to Starting the Work
31 09 13	Geotechnical Instrumentation & Monitoring	Proposed Format & Pre-Construction Survey Report	Not less than 30 Days Prior to Starting the Work
31 09 13	Geotechnical Instrumentation & Monitoring	Detailed Monitoring and Instrumentation Program	Not less than 30 Days Prior to Starting the Work
31 09 13	Geotechnical Instrumentation & Monitoring	Qualifications of Monitoring Personnel	Not less than 30 Days Prior to Starting the Work
31 09 13	Geotechnical Instrumentation & Monitoring	Post-Construction Survey Report	Prior to Removal of Geotechnical Monitoring Equipment & Final Payment Request
31 09 13	Geotechnical Instrumentation & Monitoring	Final Copies of Working and As-Built Drawings	Prior to Final Payment Request
31 10 00	Site Preparation	Site Preparation Work Plan	With Bid
31 10 00	Site Preparation	Site Surveys	As Required
31 23 16	Excavation	Excavation Work Plan	Not less than 30 Days Prior to Starting the Work
31 23 16	Excavation	Survey Results	See Technical Specification for Details
32 31 13	Chain Link Fence	Chain Link Fence	Not less than 30 Days Prior to Starting the Work
32 31 24	Waterfowl Barrier	Product Data and Material Samples	Not less than 30 Days Prior to Starting the Work
32 91 13	Planting Soils	Planting Soil Plan	Not less than 30 Days Prior to Starting the Work
32 91 13	Planting Soils	Material Quantities and Toxicology Testing	Weekly as Required

Table 1
List of Submittals

Section	Section Name	Submittal Title	Deadline
32 91 13	Planting Soils	Testing Agency Qualification Data	Not less than 30 Days Prior to Starting the Work
32 91 13	Planting Soils	Field Quality Control Reports	As Required
32 93 01	Intertidal Vegetation	Intertidal Vegetation Plan	60 Calendar Days After Notice to Proceed
32 93 01	Intertidal Vegetation	Intertidal Vegetative Shelf Maintenance Schedule	Prior to Final Payment Request
35 43 00	Cap Construction	Capping Plan	Not less than 30 Days Prior to Starting the Work
35 43 00	Cap Construction	Borrow Source Characterization Report	Not less than 30 Days Prior to Import of Materials
35 43 00	Cap Construction	Certifications for Reactive Material, ACB, Concrete	Not less than 30 Days Prior to Import of Materials
35 43 00	Cap Construction	Fill Material Samples	Not less than 30 Days Prior to Import of Materials
35 43 00	Cap Construction	Delivery Tickets	Prior to Final Payment Request
35 43 00	Cap Construction	Field QC Testing Reports	See Technical Specification for Details
35 43 00	Cap Construction	Survey Results	See Technical Specification for Details
44 08 40	Water Treatment System Requirements	Engineering Design Report	Not less than 30 Days Prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Water Treatment System Plan	Not less than 30 Days prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Treatment Process Equipment List	Prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Civil and Mechanical Drawings	Prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Process and Electrical Drawings	Prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Water Treatment System Start-up Plan	Not less than 30 days prior to mobilization for excavation
44 08 40	Water Treatment System Requirements	Permit Applications and Associated Submittals	Not less than 30 Days Prior to Mobilization for Excavation
44 08 40	Water Treatment System Requirements	Wastewater Treatment Service Reports and Records	System Start-up, Testing, Weekly Operation
44 08 40	Water Treatment System Requirements	Operation and Maintenance (O&M) Plan	Not less than 30 days prior to mobilization for excavation

Table 1
List of Submittals

Section	Section Name	Submittal Title	Deadline
44 08 40	Water Treatment System Requirements	System Shutdown and Decommissioning Plan	Not less than 30 days prior to mobilization for excavation
44 08 40	Water Treatment System Requirements	RTA1 Equipment Staging and Canal Navigation Plan	Not less than 30 days prior to mobilization for excavation

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 35 29.13

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Site is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund site. This Section specifies the minimum health and safety submission and work requirements for the Site. The Contractor shall develop and implement an overall Site-specific Health and Safety Plan (HASP).

2. Assume responsibility for the means and methods of job-site safety including general safety oversight authority for the health, safety, and protection of the Contractor and subcontractor on-site personnel, visitors, and the general public during the performance of the Work. Provide facilities, labor, materials, tools, equipment, appliances, transportation, and supervision necessary to complete the Work specified in this Section in a safe, diligent and compliant manner.

3. Community air monitoring will be performed by others. The Contractor shall abide by the Site-specific Community Air Monitoring Plan (CAMP).

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

A. The Site-specific HASP developed by the Contractor and all Work conducted on-site shall be in accordance with, but not limited to, the requirements of the following references, as applicable to the Work:

1. AKRF-KSE JV 2019. Construction Health and Safety Plan;

2. AKRF-KSE JV 2019. Community Air Monitoring Plan;

3. Occupational Safety and Health Administration (OSHA). General Duty Clause of the U.S. Occupational Safety and Health Act, 29 U.S.C., Section 654, Subsections 5 (a) 1, 5(a)2 and 5(b);

4. OSHA. Standards and Regulations contained in Title 29, Code of Federal Regulations (CFR), including, but not limited to:

a. Part 1904 “Recording and Reporting Occupational Injuries and Illnesses”;

b. Part 1910 “General Industry Regulations”;

c. Part 1926 “Construction Regulations”;

d. 1910.120 “Hazardous Waste Operations and Emergency Response”;

e. 1910.1200 “Hazard Communication”; and

f. 1926.16 “Rules of Construction.”

5. National Institute of Occupational Safety and Health (NIOSH)/OSHA/United States Coast Guard (USCG)/United States Environmental Protection Agency (EPA) Occupational Safety and Health Guidance Manual for Hazardous Site Activities, October 1985, Department of Health and Human Services (DHHS) NIOSH Publication Number 85-115.

1.4 SUBMITTALS

A. Submit the following Informational Submittals to the Engineer in accordance with Section 01 33 00 – Submittal Procedures:

1. A Site-specific HASP, as required in this Section. When addenda are added to the existing HASP or when a new HASP is developed by the Contractor, an electronic copy of the documents shall be submitted to the Engineer for review, comment, and approval by the Engineer and EPA. Once review is completed, an electronic copy of the finalized documents shall be provided to the Engineer and EPA.

2. The following valid training certificates, as required in this Section:

a. Initial 40-hour Hazardous Waste operations and emergency response (HAZWOPER) training;

b. Initial 24-hour HAZWOPER training;

c. Eight-hour HAZWOPER supervisor training; and

d. Annual eight-hour HAZWOPER refresher training.

3. Incident Reports: Submit in accordance with Article 1.7 of this Section.

1.5 QUALITY ASSURANCE

A. Qualifications

1. HASP Preparer / Project Safety Professional

a. Engage a certified industrial hygienist, accredited by the American Board of Industrial Hygiene, or safety professional certified by the Board of Certified Safety Professionals, to prepare or supervise preparation of the Contractor's HASP.

b. Project Safety Professional shall review the available chemical data, the specified scope of work and Site conditions and develop the HASP. It shall be the responsibility of the Project Safety Professional to make interpretations and draw conclusions with respect to the conditions at the Site, the scope of work, and their impact on health and safety of project personnel.

2. Site Health and Safety Officer (SHSO)

a. Engage a certified industrial hygienist, accredited by the American Board of Industrial Hygiene, or safety professional certified by the Board of Certified Safety Professionals, to assist the Project Safety Professional by managing, overseeing, and enforcing the Contractor's Health and Safety Program at the Site, and ensure compliance with the Contractor's HASP and applicable laws and regulations during the project. SHSO shall have a minimum of five years direct construction safety experience and appropriate training to supervise HAZWOPER activities.

b. SHSO shall be present at the Site at all times when the Work is being performed and shall be dedicated solely to the supervision of the Contractor's Health and Safety Program. The SHSO shall report administratively to the Contractor's Site Manager

and to the Project Safety Professional in matters pertaining to public health and on-site safety and health.

c. Responsibilities include, but are not necessarily limited to, the following:

1) Supervising the implementation of the Contractor's HASP;

2) Providing health and safety orientation training to the Contractor's employees, subcontractors, and Site visitors;

3) Attending pre-construction conferences, progress meetings, and other project meetings, as required;

4) Preparing and maintaining health and safety records and statistics;

5) Leading and documenting daily job safety briefings;

6) Preparing and submitting incident reports in accordance with Article 1.6 of this Section;

7) Leading incident investigations on the Contractor's behalf; and

8) Maintaining a continuous Health and Safety Monitoring/Oversight Program throughout the performance of the Work, including coordination/communication with the Engineer, who will occasionally observe/monitor safety performance of the Contractor and its subcontractors. It shall be the Contractor's responsibility to notify the Engineer of any deviations from the Health and Safety Monitoring Program.

1.6 HASP SUBMITTAL

A. General

1. Develop and implement a Site-specific HASP specifying the Contractor's policies and procedures to adequately protect Site workers, visitors and residents. The HASP shall comply with applicable sections of OSHA 29 CFR 1926 and 1910, and other applicable laws, regulations and codes. The HASP must establish in detail the protocols necessary for protecting workers, on-site personnel, visitors and the general public from potential physical and chemical hazards encountered during all Site activities.

2. Examine all other Sections of the Technical Specifications for requirements which affect the Work of this Section, whether or not such work is specifically mentioned in this Section.

3. Coordinate work, including safety aspects of that work, with all other trades or contracts affecting or affected by the Work of this Section and cooperate with such trades to assure the steady progress and safe execution of all of the Work.

4. Subcontractors shall provide their own amendments to the Contractor's HASP specifying the personnel and procedures applicable to their contracted scope of work. Subcontractors' amendments to the Contractor's HASP shall contain a statement indicating their intention to comply with the Contractor's HASP and information regarding their specific tasks, including the identified tasks, potential hazards, and control procedures.

5. Minimum precautions noted in this Section shall in no way relieve individual employers from their responsibility to implement stricter health and safety precautions as warranted by the Work.

6. HASP shall be kept at the Site, shall address safety and health hazards of each phase of operations at the Site, and shall include requirements and procedures for employee protection.

B. HASP Contents. HASP shall address and include the following:

1. A Signature Sheet (to include Title, Signature, and phone number of Plan Preparer & the Contractor's contact information).

2. An Organizational Structure.

a. Specific chain of command and overall responsibilities of supervisors and employees. Include the following:

1) Designation of the general supervisor who has the responsibility and authority to direct all Hazardous Waste operations;

2) Name of the Contractor's SHSO who has responsibility and authority to implement and modify the HASP and verify compliance;

3) Other personnel required for Hazardous Waste operations at the Site and emergency response, and general functions and responsibilities of each;

4) Lines of authority, responsibility, and communication; and

5) Anticipated subcontractors and suppliers.

b. Review and update the organizational structure as necessary to reflect the current status of Site operations and personnel.

3. A Site Description, background, and scope of work.

4. A Safety and Health Risk or Hazard Analysis, and planned hazard controls, for each task and operation required to complete the project, including tasks to be performed adjacent to or on the water.

5. Site Control Measures.

a. Preventing trespassing;

b. Preventing unqualified or unprotected workers from entering restricted areas;

c. Preventing the "tracking" of contaminants out of the Site;

d. Maintaining a log of employees at the Site and visitors to the Site;

e. Delineating exclusion, contamination reduction, and support zones;

f. Locating personnel and equipment decontamination zones; and

g. Communicating routes of escape and gathering points.

6. A Training Program.

a. Initial training requirements for Site workers and supervisors;

b. Exceptions to initial training requirements;

c. Site briefings for visitors and workers;

d. Refresher training requirements; and

e. Certification of training for all of the Contractor and subcontractor's employees assigned to the project.

7. A Medical Surveillance Program.
    a. Provisions of the Site medical surveillance program;
    b. Communication protocols between the Site, physicians, and workers;
    c. Medical recordkeeping procedures; and
    d. Certification of medical clearance for all of the Contractor and subcontractor's employees assigned to the project.
8. Personal Protective Equipment (PPE).
    a. PPE selection criteria;
    b. Site- and task-specific PPE ensembles, including U.S. Coast Guard-approved personal floatation device (PFD) as required by Part 2 of this Section;
    c. Training in the use of PPE;
    d. Respiratory protection;
    e. Hearing conservation; and
    f. PPE maintenance and storage.
9. An Exposure Monitoring Program.
    a. Monitoring procedures to detect the presence of hazardous substances;
    b. Monitoring procedures to determine worker exposures to hazardous substances and physical hazards;
    c. Action levels and required responses for known and expected hazardous substances and physical hazards; and
    d. Calibration and maintenance procedures for monitoring equipment.
10. An Air Monitoring Program.
11. A Heat Stress Prevention Program.
12. A Spill Containment Program.
13. A Decontamination Program
    a. Location and type of temporary decontamination facilities;
    b. General and specific decontamination procedures for personnel and PPE;
    c. General and specific decontamination procedures for equipment and vehicles;
    d. Handling of residual waste from decontamination;
    e. Decontamination equipment and materials; and
    f. Monitoring procedures used to evaluate the effectiveness of decontamination.

14. An Emergency Response Plan
    a. Potential emergencies that may occur at the Site;
    b. Pre-emergency planning;
    c. On-site emergency response equipment, materials, and PPE;
    d. Emergency Maps, including evacuation routes, gathering points, and a route to the nearest hospital;
    e. Emergency roles and responsibilities;
    f. Emergency alerting and evacuation procedures for Site personnel; and
    g. Procedures for notifying, and a list of emergency contact information for:
        1) Emergency responders, including fire officials, ambulance service, poison control, police, and local hospitals;
        2) Authorities having jurisdiction;
        3) The Responsible Parties and the Engineer;
        4) The Contractor's project manager, Site superintendent, SHSO, and foreman; and
        5) Other entities, as required;
    h. Emergency response procedures;
    i. Emergency decontamination, medical treatment, and first-aid; and
    j. Emergency response training.
15. Any other standard operating procedures applicable to the Work.

C. The submittal procedure shall be as follows.
    1. The Contractor will submit their HASP to the Engineer the sooner of: seven days prior to the pre-construction meeting, or 30 days prior to the Contractor's scheduled mobilization to the Site.
    2. The Engineer's review and acceptance will not extend to safety measures, means, methods, techniques, procedures of construction, or whether representations made in the HASP comply with laws and regulations, or standards of good practice.
    3. No Work should be performed at the Site until the written HASP has been accepted by the Engineer.

D. Review of HASP shall be as follows.
    1. It will be the responsibility of the Contractor to incorporate appropriate provisions into its HASP. The Contractor will not be permitted to initiate the Work until the HASP has been finalized and accepted by the Engineer and EPA. Acceptance of the HASP indicates only that the HASP complies with the requirements of this Section. Suitability of the HASP for the Work, and the means and methods therein, is the responsibility of the Contractor.

E. Modifications
    1. It shall be the Contractor's responsibility to notify the Engineer verbally and in writing as quickly as possible should any unforeseen safety hazard or condition become evident

during the performance of the Work. In the interim, the Contractor shall take prudent action to establish and maintain safe working conditions and to safeguard workers, on-site personnel, visitors, potential off-site receptors, and the environment in accordance with the established emergency response procedures detailed in the Contractor's HASP.

1.7 INCIDENT REPORTING AND INVESTIGATION

A. Immediately notify the Responsible Parties and the Engineer of all incidents that:

1. Result in bodily injury, illness, or property damage;
2. Affect the environment; and/or
3. Involve the public.

B. Submit incident report to the Responsible Parties and the Engineer within 8 hours after an incident occurs. Include in each report the following:

1. Date, time, and location of the incident;
2. Names of all Site personnel involved in or affected by the incident;
3. A description of the incident and activities being performed when the incident occurred;
4. Medical treatment administered, if any; and
5. The nature and seriousness of injury or damage.

C. Comply with 29 CFR 1904.29, including using OSHA 300, 300-A, and 301 forms (or equivalent) to document all incidents that result in bodily injury.

D. Based upon results of incident investigation, modify the HASP as required by changing tasks or procedures to prevent reoccurrence of the accident.

E. Post current copy of the Contractor's OSHA 300-A report at a conspicuous place at the Site.

1.8 TRAINING, MEDICAL MONITORING, INFORMATION, COMMUNICATION

A. Prior to initiation of the Work, the Contractor shall verify that personnel assigned to perform or supervise work within an exclusion zone (EZ) and/or contaminant reduction zone (CRZ) and/or will contact contaminated environmental media at the Site [primarily Non-Aqueous Phase Liquid (NAPL)-impacted soils, sediments and water] have received appropriate training in compliance with 29 CFR 1910.120 (i.e., HAZWOPER), including initial 40 hour Training and annual 8 hour refreshers, as well as 8 hour Supervisor Training for designated individuals functioning in an on-site HAZWOPER supervisory capacity.

B. Active participation in a program of periodic medical monitoring in accordance with 29 CFR 1910.120 (f), at a frequency recommended by a physician, but no less frequent than biennial, is required for personnel working in exclusion zones and contamination reduction zones, and/or will contact contaminated environmental media at the Site.

C. Ensure that only personnel having successfully completed the required training and medical surveillance, commensurate with their work, are permitted to perform the Work at the Site, and records of such training and medical surveillance shall be maintained by the Contractor at the Site. It will be the individual employer's responsibility to provide requisite training and medical surveillance to its employees and to ensure subcontractors' employees are qualified as such.

D. At least one individual, designated by the Contractor and its subcontractors, who has current certification (Red Cross or equivalent) in basic first aid and cardiopulmonary resuscitation

(CPR) must be present at each active work location on the Site at all times during work activities. First-aid-trained personnel must also have received training and information regarding OSHA's Bloodborne Pathogen Standard, including the required use of "universal precautions."

E. A minimum of one person trained in operation of Automated External Defibrillators (AEDs) shall be present at each active work location at all times during Work activities.

F. Coordinate with local emergency responders prior to mobilization to develop procedures for emergency rescue from the Canal.

G. The Contractor and subcontractors shall comply with additional training requirements as may be applicable to the Work, including but not limited to: Hazard Communication, Respiratory Protection, Emergency Response Procedures, Construction Safety, and all other training as applicable to the Work and required by other applicable regulations within 29 CFR 1926 and 1910.

H. Prior to initiation of the Work, the Project Safety Professional and SHSO shall attend a process safety review meeting with the Engineer to evaluate the risks of hazards associated with the Work and mitigation measures.

I. Implement a program of on-site safety communication, information, and oversight, consisting of such measures as Site safety orientations, daily toolbox meetings, and regular/periodic safety meetings. Workers shall be encouraged during the Site safety orientation and periodically thereafter to report unsafe work practices or workplace conditions to their supervisor and/or SHSO, and to discontinue or delay their work ("stop work") should it represent an imminent hazard or otherwise unacceptable safety risk.

J. Ensure that all required postings are in place, including, but not limited to OSHA poster, applicable labor and wage posting, and emergency response contact information.

1.9 HAZARD COMMUNICATION

A. Upon observing or becoming aware of any unsafe condition which poses an imminent danger to on-site workers, visitors, or the general public, the Contractor shall "stop work" and notify the individual(s) affected, their supervisor, and the Engineer of the condition and of corrective actions to be taken.

B. The Contractor and each subcontractor must have a written Hazard Communication Program. This program must be available on-site for review and approval by the Engineer and EPA.

C. The Contractor shall ensure that Safety Data Sheets for chemical products brought on-site by the Contractor and all subcontractors are maintained at the Site and made available to the Engineer and other affected personnel upon request.

1.10 LOGS, REPORTS, AND RECORDKEEPING

A. The Contractor shall maintain logs and reports covering the implementation of the HASP and other requirements of this Section. The formats shall be developed by the Contractor and the template format submitted as part of the HASP.

PART 2: PRODUCTS

2.1 PERSONAL PROTECTIVE EQUIPMENT

A. Minimum PPE to be worn during the Work in all worksite areas of the Site includes hard hats, work boots, safety glasses and standard work clothes. Additional PPE shall be used as appropriate and as required for the Work to be performed.

B. USCG-approved Type III or Type V PFDs shall be provided and properly worn in closed fashion (zipped, tied, latched, etc.) by all persons in the following circumstances:

1. On floating pipelines, pontoons, rafts, or stages;
2. On structures or equipment extending over or next to water, except where guardrails, personal fall protection system, or safety nets are provided for employees;
3. When working alone at night where there are drowning hazards, regardless of other safeguards provided;
4. In skiffs, small boats, or launches, unless in an enclosed cabin or cockpit;
5. On open decks of marine vessels, except where guardrails, personal fall protection systems, or safety nets are provided for employees; or
6. Whenever there is a drowning hazard.

C. The Contractor shall oversee all use of PPE necessary to be in compliance with the HASP for all Site personnel. The Contractor shall make PPE available for use by Site visitors.

PART 3: EXECUTION

3.1 IMPLEMENTATION OF THE HASP

A. It shall be the sole responsibility of the Contractor to ensure that all health and safety requirements are implemented in accordance with the Contractor's HASP and applicable regulations.

B. The Engineer and EPA reserve the right to observe and monitor, from time to time, the health and safety performance of the Contractor and its subcontractors pertaining to their adherence to this Section, and to advise the Responsible Parties accordingly.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section summarizes the regulatory requirements for implementing the Work.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES (NOT USED)

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer in accordance with Section 01 33 00 – Submittal Procedures:

1. Copies of all local, county, or municipal permits obtained in order to perform the Work; and

2. If a water source is required for the Work, the Contractor is responsible for obtaining hydrant permits.

1.5 CONTRACTOR RESPONSIBILITES

A. The Contractor shall comply with all applicable local, county, and municipal rules, ordinances, codes, and regulations in order to successfully implement the Work.

B. The Contractor is responsible for verifying that the permits are applicable to the Work. The Contractor shall inform the Engineer with written justification if a permit on the list below is not necessary for completion of the Work, or if a permit(s) is required but not listed below. The Engineer will coordinate with the Responsible Parties and EPA to verify the Contractor's request to amend the list below.

1. Hydrant use permit (New York City Department of Environmental Protection [NYCDEP]).

2. Any other permits that may be required by the means and methods employed by the Contractor.

C. The Contractor is not responsible for obtaining Federal and State permits. Due to the regulatory nature of the Site, the Engineer will work directly with the EPA to obtain permit equivalency for Federal and State permits, including the State Pollution Discharge Elimination System (SPDES) General Permit or the General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002). Therefore, the Contractor is not required to submit a Notice of Intent (NOI). However, the Contractor must implement and comply with the requirements provided in the Construction Drawings and Section 01 57 13 – Temporary Erosion and Sediment Control. The Contractor must also comply with requirements of the SPDES General Permit and implement water treatment in accordance with the Construction Drawings and Section 44 08 40 – Water Treatment System Requirements.

D. All necessary local permits shall be obtained and paid for by the Contractor.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 51 00

TEMPORARY UTILITIES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. Connections and costs for temporary utilities associated with implementing the Work shall be the responsibility of the Contractor.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 41 00 – Regulatory Requirements

C. Section 01 57 19 – Temporary Environmental Controls

D. Section 01 78 00 – Contractor Closeout Submittals

1.3 REFERENCES

A. The following standards and references are used in this Section:

1. Rules of the City of New York (RCNY). Title 15: Department of Environmental Protection.

2. New York Administrative Code (NYAC). Title 24: Environmental Protection and Utilities.

1.4 SUBMITTALS

A. The Contractor shall submit a Temporary Utilities Plan to the Engineer in accordance with Section 01 33 00 – Submittal Procedures. The Temporary Utilities Plan shall include the following:

1. Sanitary facilities;

2. Communication;

3. Electricity;

4. Water; and

5. Fire suppression equipment.

PART 2: PRODUCTS

2.1 EQUIPMENT

A. The Contractor shall provide, maintain, and pay for the temporary utilities required for the Work.

PART 3: EXECUTION

3.1 TEMPORARY SANITARY FACILITIES

A. The Contractor shall install and maintain temporary sanitary toilet facilities in accordance with any local laws, regulations, or requirements and in accordance with Section 01 41 00 – Regulatory Requirements.

B. The temporary sanitary toilet facilities shall be adequate for the anticipated workforce (including for the Contractor, subcontractors, Engineer, and an additional 10 people) that will be utilizing the facilities.

C. The Contractor shall be responsible for servicing and maintaining the temporary toilet facilities and associated equipment. The temporary toilet facilities shall be serviced on a weekly schedule or as recommended by the service providing the temporary toilet facilities.

D. The Contractor shall comply with all minimum requirements of the New York City Health Department.

3.2 TEMPORARY ELECTRICITY

A. The Contractor shall install and maintain electrical power needed to implement the Work.

B. If the Contractor desires to use generators or other off-grid sources, their use shall be approved by the Engineer. Off-grid sources shall comply with requirements set forth in RCNY Title 15, Chapter 28: "Citywide Construction Noise Mitigation," New York Administrative Code Title 24, Chapter 1: "Environmental Protection and Utilities – Air Pollution Control," and Section 01 57 19 – Temporary Environmental Controls.

C. The Contractor shall be responsible for installing and maintaining all temporary wiring, feeders, appurtenances, and connections necessary to perform the Work in accordance with any local laws, regulations, or requirements.

D. Renewable energy shall be used to the extent possible. EnergyStar™ appliances, if available, shall be used. Documentation of renewable energy and EnergyStar™ appliances shall be submitted to the Engineer.

3.3 TEMPORARY WATER

A. The Contractor may apply for a hydrant permit for a temporary source of water with the City of New York.

B. The Contractor shall install all temporary piping, hoses, connections, and appurtenances required to deliver water to every point where needed. If freezing temperatures are expected during the Work, materials shall be winterized to prevent leaking.

C. Potable water shall be available for workers.

D. Water from the Gowanus Canal shall not be used for construction purposes.

3.4 FIRE SUPPRESSION

A. The Contractor shall install and maintain an adequate number and size of fire suppression equipment and appurtenances for the Work in accordance with any local laws, regulations, or requirements, and in accordance with Section 01 41 00 – Regulatory Requirements.

B. Service and maintenance for the fire suppression equipment shall be performed as recommended by the Contractor providing the equipment.

C. The Contractor shall not burn rubbish and construction waste materials.

3.5 CLEAN UP

A. The Contractor shall remove all materials and equipment described in this Section prior to final inspection in accordance with Section 01 78 00 – Contractor Closeout Submittals, unless otherwise approved by the Engineer and EPA.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 52 13

TEMPORARY FIELD OFFICES AND STRUCTURES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. Field offices shall be located in the area designated on the Construction Drawings.
2. Maintain field offices at the Site for the Responsible Parties, the Engineer, EPA, and the Contractor.
3. Provide required storage and work sheds.
4. Field offices shall be complete, fully functional, and ready for occupancy within 14 days after the Engineer's approval of the submittal required by this Section.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 51 00 – Temporary Utilities

C. Section 01 52 16 – First Aid Facilities

1.3 REFERENCES (NOT USED)

1.4 SUBMITTALS

A. Submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures:

1. Field Office Submittal. Submit, as a single submittal, the following:
   a. A Site plan indicating the proposed location of field offices, parking for field offices, and facilities related to the field offices;
   b. A listing of utility providers (if applicable); and
   c. Product data and technical information for a multifunction printer and telephone system.

PART 2: PRODUCTS

2.1 FIELD OFFICES (TWO TRAILERS)

A. One field office trailer (for the Contractor and the Engineer) shall consist of a Mobile Office manufactured by ModSpace (or equivalent), provide a minimum of 460 square feet of floor space (with a 10-foot minimum width), and be partitioned to provide three separate spaces (at least one of which will serve as a shared common area). A minimum of two outside doors will be required. A sign reading "All Site Visitors Must Sign-In Here" shall be affixed to the trailer exterior of the Contractor's trailer.

1. Trailers shall be completely weather-tight and insulated.
2. Windows shall each have an insect screen and operable sash. Each window must include a lock and exterior security bars approved by the Engineer.

3. Each trailer shall have two doors for ingress and egress, each with landing, stairs, and railings conforming to building codes in effect at the Site.

    a. Landing and stairs shall be metal, pressure-treated wood, fiberglass, or concrete, and have slip-resistant walking surfaces.

    b. Railing shall be metal, wood, or fiberglass.

    c. Doors shall be secure and lockable, and each furnished with a suitable, lockable security bar by Master Lock or equal.

4. Two identical sets each of keys suitable for operating all keyed locks (including ingress/egress door locks, security bars for doors, window locks, closets, and office furnishings) shall be given to the Engineer.

B. One field office trailer (for EPA) shall consist of a Mobile Office manufactured by ModSpace (or equivalent) and provide a minimum of 160 square feet of floor space (with an 8-foot minimum width).

1. Trailers shall be completely weather-tight and insulated.

2. Windows shall each have an insect screen and operable sash. Each window must include a lock and exterior security bars approved by the Engineer.

3. Trailer shall have at least one door for ingress and egress, each with landing, stairs, and railings conforming to building codes in effect at the Site.

    a. Landing and stairs shall be metal, pressure-treated wood, fiberglass, or concrete, and have slip-resistant walking surfaces.

    b. Railing shall be metal, wood, or fiberglass.

    c. Door(s) shall be secure and lockable, and each furnished with a suitable, lockable security bar by MasterLock or equal.

4. Two identical sets each of keys suitable for operating all keyed locks (including ingress/egress door locks, security bars for doors, window locks, closets, and office furnishings) shall be given to the Engineer and EPA.

C. The Contractor shall provide and maintain, in accordance with all applicable codes and regulations, the fire protection system (e.g., fire extinguishers, sprinklers, etc.) and electric, heating, and cooling services for the office trailers.

2.2 FIELD OFFICES UTILITIES

A. Comply with Section 01 51 00 – Temporary Utilities.

B. Provide the following for each field office:

1. Electrical System and Lighting

    a. Electric service as required, including paying all costs.

    b. Interior lighting of 50 foot-candles at desktop height or one fluorescent light every 15 feet overhead.

    c. A minimum of eight 120-volt, wall-mounted, duplex convenience electrical receptacles.

    d. Exterior, wall-mounted, 250-watt lighting at each entrance.

2. Heating, Ventilating, and Air Conditioning

    a. Automatic heating and automatic cooling to maintain indoor temperature as specified in Section 01 51 00 – Temporary Utilities.

    b. Furnish all fuel and pay all utility costs.

3. Telephone Service

    a. Private telephone service, including payment of installation, monthly, and service costs.

    b. Provide one telephone line per trailer, each with separate telephone number assigned by the telephone company.

    c. Pay for unlimited local and long-distance service for duration of the project.

4. Internet Service

    a. Obtain and pay for Internet service, with unlimited (untimed) Internet access, until removal of field office trailers.

    b. Provide fiber-optic or cable connection with appropriate modem and appurtenances, and dual-band Wireless-N router.

    c. Minimum Speed: Up to 15 megabits per second download, up to 1 megabit per second upload.

    d. Provide a Wireless-G router capable of supporting a minimum of four users simultaneously for each field office trailer occupied by the Contractor, the Responsible Parties, and the Engineer.

    e. Set up system and appurtenances required and verify functionality in each field office space.

C. Should the actions of utility the companies delay the complete set up of field offices, the Contractor shall provide temporary electricity, heat, telephone, and internet service as required at no additional cost to the Responsible Parties.

2.3 FIELD OFFICE FURNISHINGS AND EQUIPMENT

A. Provide the following furnishings and equipment for the 460-square foot field office trailer (specified in Part 2.1.A of this Section):

1. Desks: Four five-drawer desks, each five feet long by 2.5 feet wide with at least one file drawer per desk suitable for storing 8.5-inch by 11-inch documents.

2. Desk Chairs: Four new or used (in good condition) five-point, high backed, cushioned swivel chairs.

3. Other Chairs: Ten metal folding chairs without arm rests.

4. Tables

    a. Two new or used (in good condition) portable folding tables, each 8 feet long by 2.5 feet wide.

    b. Two new or used (in good condition) portable folding tables, each 6 feet long by 2.5 feet wide.

5. Plan rack(s) to hold a minimum of eight sets of the Construction Drawings.

6. Two four-drawer, legal size, fire-proof file cabinets with locks.
7. Four polyethylene waste baskets, each with minimum capacity of seven gallons.
8. Suitable doormats at each exterior ingress/egress door.
9. One tack board, approximately three feet long by 2.5 feet wide, with thumbtacks.
10. One white board for use with dry markers, approximately six feet long by four feet wide, with a marker holding tray, installed by the Contractor at a location selected by the Engineer. Furnish a supply of colored markers and eraser for the white board.
11. A fire extinguisher with associated signage and a smoke detector, in accordance with laws and regulations. At a minimum, provide two wall-mounted fire extinguishers and one battery-operated, ceiling-mounted smoke detector. Comply with fire protection requirements of Section 01 51 00 – Temporary Utilities.
12. One first aid station. Comply with Section 01 52 16 – First Aid Facilities.
13. Two electric clocks.
14. One electric coffee maker with a ten-cup capacity or larger.
15. One microwave oven with a minimum capacity of 0.9 cubic foot.
16. Two refrigerators, each with a minimum capacity of 2.5 cubic feet.
17. Bottled water with an electric cooler dispenser for five-gallon bottles, and a cup dispenser.
18. Multifunction Printer
    a. One new or used (in good condition) machine with the following functions:
        1) Photocopying;
        2) Network printing;
        3) Scanning to produce PDF and JPG files;
        4) E-mail; and
        5) Fax via telephone line.
    b. Products and Manufacturers. Provide one of the following:
        1) Brother MFC-j690dw printer; or
        2) Approved equal.
    c. Provide necessary cables and appurtenances to enable all functions specified in this Section, including scan-and-email and printing from field office computers.
19. Telephone System
    a. Telephone System Features:
        1) Provide two cordless telephones, each with a hands-free speaker, speed dialing with a minimum of 16 programmable numbers, volume control, an LCD display, and buttons for hold and mute.
        2) Set up and verify the operation of each telephone set.
    b. Provide two digital telephone answering machines.

B. Provide the following furnishings and equipment for the minimum 160-square foot field office trailer (specified in Part 2.1.B):

1. Desks: One five-drawer desk, five feet long by 2.5 feet wide, with at least one file drawer suitable for storing 8.5-inch by 11-inch documents.
2. Desk Chairs: One new or used (in good condition) five-point, high backed, cushioned swivel chair.
3. Other Chairs: Three metal folding chairs without arm rests.
4. Tables: One new or used (in good condition) portable folding table, 6 feet long by 2.5 feet wide.
5. Plan rack(s) to hold a minimum of eight sets of the Construction Drawings.
6. One four-drawer, legal size, fire-proof file cabinet with a lock.
7. Two polyethylene waste baskets, each with a minimum capacity of seven gallons.
8. Suitable doormats at each exterior ingress/egress door.
9. One tack board, approximately 3 feet long by 2.5 feet wide, with thumbtacks.
10. One white board for use with dry markers, approximately six feet long by four feet wide, with a marker holding tray, installed by the Contractor at a location selected by the Engineer (in consultation with EPA). Furnish a supply of colored markers and eraser for the white board.
11. A fire extinguisher with associated signage and smoke detector, in accordance with laws and regulations. At a minimum, provide two wall-mounted fire extinguishers and one battery-operated, ceiling-mounted smoke detector. Comply with the fire protection requirements of Section 01 51 00 – Temporary Utilities.
12. One first aid station. Comply with Section 01 52 16 – First Aid Facilities.
13. One electric clock.
14. One electric coffee maker with a ten-cup capacity or larger.
15. One microwave oven with a minimum capacity of 0.9 cubic foot.
16. One refrigerator with a minimum capacity of 2.5 cubic feet.
17. Bottled water with an electric cooler dispenser for five-gallon bottles, and a cup dispenser.
18. Multifunction Printer
    a. One new or used (in good condition) machine with the following functions:
        1) Photocopying;
        2) Network printing;
        3) Scanning to produce PDF and JPG files;
        4) E-mail; and
        5) Fax via telephone line.

b. Products and Manufacturers: Provide one of the following:

1) Brother MFC-j690dw printer; or

2) Approved equal.

c. Provide necessary cables and appurtenances to enable all functions specified in this Section, including scan-and-email and printing from field office computers.

19. Telephone System

a. Telephone System Features:

1) Provide a cordless telephone with a hands-free speaker, speed dialing with a minimum of 16 programmable numbers, volume control, an LCD display, and buttons for hold and mute.

2) Set up and verify the operation of the telephone set.

b. Provide a digital telephone answering machine.

C. Provide two-way portable radios and charging units for the Engineer and the Contractor's key personnel (e.g., superintendent, foreman, etc.).

2.4 STORAGE AND WORK SHEDS

A. Provide storage and work sheds sized, furnished, and equipped to accommodate personnel, materials, and equipment involved in the Work, including temporary utility services and facilities required for environmental controls sufficient for personnel, materials, and equipment.

PART 3: EXECUTION

3.1 INSTALLATION

A. Install field offices and related facilities in accordance with laws and regulations.

B. Install materials and equipment, including pre-fabricated structures, in accordance with manufacturer's instructions.

3.2 CLEANING, MAINTENANCE, AND SUPPLIES

A. Provide the following maintenance services:

1. Immediately repair malfunctioning, damaged, leaking, or defective field offices, sheds, Site improvements, systems, and equipment.

2. Promptly provide snow removal for field offices, including parking areas, walkways, and stairs and landings.

3. Provide continuous maintenance and janitorial service of field offices and sanitary facilities. Clean field offices at least once per week.

4. Properly dispose of trash as needed, at least twice per week. Dispose of other waste, if any, as required, to avoid creation of nuisances.

B. Provide the following consumables, as needed:

1. Light bulbs for interior and exterior lights.

2. Toner or ink cartridges for multifunction printers.

3. Paper supplies for multifunction printers.

4. Dry markers in six colors and white board eraser sets.
5. Bottled water suitable for water dispensers, and disposable cups.
6. Coffee supplies, including disposable cups, filters, coffee, sugar, creamer, and stir-sticks.
7. Soap, paper towels, cleansers, sanitary supplies, and janitorial implements, including a broom.
8. Batteries for smoke detectors and other battery-powered items furnished by the Contractor.
9. Replacement fire extinguishers.
10. Replenishment of the contents of first aid kits.

3.3 REMOVAL

A. Do not remove field offices and sheds until after substantial completion and approval is provided by the Engineer and EPA. Upon removal and prior to final inspection, the Contractor must restore all areas where the field offices had been.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 52 16

FIRST AID FACILITIES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall provide first aid facilities during the Work:

a. Pay all costs for first aid facilities, including installation, maintenance, and removal;

b. Maintain, including cleaning, first aid facilities and keep first aid facilities continuously supplied with consumables;

c. Ensure facilities are adequate for personnel using the Site and the requirements of the project; and

d. Ensure facilities are in compliance with laws and regulations.

1.2 RELATED SECTIONS

A. Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American National Standards Institute (ANSI) Z308.1, Minimum Requirements for Workplace First Aid Kits and Supplies.

2. ANSI Z358.1, Emergency Eye Wash and Shower Equipment.

1.4 REQUIREMENTS FOR FIRST AID FACILITIES

A. Provide temporary first aid stations at or immediately adjacent to the Site's major work areas, and inside the temporary field offices. Locations of first aid stations shall be determined by the Contractor's safety representative. At a minimum, first aid stations provided shall include:

1. One first aid kit complying with ANSI Z308.1.

2. One eyewash station complying with ANSI Z358.1.

B. Provide a list of emergency telephone numbers at each hardwired telephone at the Site. Lists shall be in accordance with the list of emergency contact information required in Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

C. When the Work is in progress, provide at the Site at least one person trained in first aid and cardiopulmonary resuscitation (CPR). First aid- and CPR-trained personnel shall possess a valid certificate indicating that they have successfully completed a first aid and CPR training course by the American Red Cross or similar entity.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 INSTALLATION

A. Location of temporary first aid facilities shall be as specified in Article 1.4 of this Section.

3.2 USE

A. Properly supervise temporary first aid facilities.

B. Properly dispose of wastes.

1. Check temporary first aid stations not less than weekly to verify that sufficient consumables are available. Provide additional consumables if the supply on hand is insufficient.

3.3 REMOVAL

A. Completely remove temporary first aid facilities and materials when no longer required and approval of the Engineer; and

B. Repair damage caused by temporary first aid facilities and their removal, and restore the Site to the pre-Work condition. If restoration of damaged areas is not specified, restore the area to pre-construction condition.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 55 29

STAGING AREAS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall haul, transport within the Site, stockpile, and safely grade/slope stockpiled cap and backfill material prior to placement.

2. The Contractor shall use best management practices to keep stockpile areas free of water, debris, and foreign material, and employ protective measures to keep cap and backfill materials safe from environmental stressors (e.g., weather, ultraviolet light, etc.) while storing cap and backfill materials prior to mixing and/or placement.

1.2 RELATED SECTIONS

A. Section 01 32 01 – Construction Progress Documentation

B. Section 01 33 00 – Submittal Procedures

C. Section 01 57 19 – Temporary Environmental Controls

D. Section 31 10 00 – Site Preparation

1.3 REFERENCES (NOT USED)

1.4 SUBMITTALS

A. The Contractor shall Submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures:

1. Material Staging and Transport Work Plan: Submit an acceptable plan for material staging and transport and related work not less than 30 days prior to starting the Work. Include the following:

a. Means, methods and equipment proposed for transporting and stockpiling or storing materials prior to placement;

b. Means, methods, and best management practices to be utilized for keeping material stockpile areas free of water, debris, and foreign material, and environmental stressors during handling of materials prior to use in construction; and

c. Means and methods of preventing cross-contamination of stockpiled materials in the staging area during adjacent construction.

2. Daily Progress Reports according to Section 01 32 01 – Construction Progress Documentation.

PART 2: PRODUCTS

2.1 GENERAL

A. Protect the imported stockpiled materials according to manufacturer recommendations, and supply materials required to provide this protection; and

B. Provide minimum protection of 6 mil plastic sheeting, which is to be secured and free from holes or other damage any time stockpiles are not being accessed or as directed by the Engineer, to prevent precipitation from entering the stockpiles.

PART 3: EXECUTION

3.1 GENERAL

A. Prior to implementing any of the Work described in this Section, the Contractor shall become thoroughly familiar with the Site conditions, access, transport, staging and stockpile conditions, and all portions of the Work falling within this Section. If stored on the Staging Site, the Contractor shall show the material staging and storage areas on the Site Preparation Work Plan as described in Section 31 10 00 – Site Preparation. The Contractor may propose alternate access transport, staging, and lay down areas for approval by the Engineer.

B. Material shall not be transported to the Site without prior approval of the Material Staging and Transport Work Plan.

C. When transporting the materials within the Site, the Contractor shall minimize spills and apply dust controls in accordance with Section 01 57 19 – Temporary Environmental Controls. If spills occur, the Contractor shall manage them in accordance with Section 01 57 19 – Temporary Environmental Controls.

3.2 STOCKPILING OF CAP AND BACKFILL MATERIALS

A. Stockpiled materials shall be labeled with signs.

B. Stockpiles shall be located in areas approved by the Engineer.

C. Stockpiles shall be of neat configurations, graded to drain, have side slopes no steeper than 3H: 1V. The Contractor shall protect the stockpiles sufficiently so that they are ready to use without delays to the project.

D. Loose material stockpiles shall be protected from wind and precipitation to protect against erosion in accordance with Part 2.1 of this Section.

E. Container stockpiles of Granular Activated Carbon, oleophilic clay, bentonite for backfill, and other materials shall be stored and protected as recommended by the manufacturer and as approved by the Engineer.

F. The Contractor shall secure material and equipment in accordance with Section 31 10 00 – Site Preparation.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Work in this Section includes installation and maintenance of temporary erosion and sediment control measures.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites

C. Section 01 57 19 – Temporary Environmental Controls

D. Section 02 51 19 – Excavated Material and Waste Management

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. New York State Department of Environmental Conservation (NYSDEC). November 2016, or most recent version.

2. New York State (NYS) Standards and Specifications for Erosion and Sediment Control (E&SC).

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer in accordance with Section 01 33 00 – Submittal Procedures:

1. Manufacturer's product data to be used for E&SC measures;

2. Signed Contractor Certification;

3. Team contact information;

4. Weekly inspection forms;

5. Certificates of E&SC training for the Contractor's personnel (qualified inspector and trained contractor) who will conduct soil and erosion control inspections; and

6. A copy of the completed checklists, to be submitted at the end of the project.

1.5 HEALTH AND SAFETY REQUIREMENTS

A. The Contractor shall comply with environmental health and safety/training requirements in accordance with the approved Health and Safety Plan and Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

PART 2: PRODUCTS

2.1 GENERAL

A. Materials for E&SC measures shall be in accordance with this Section, the NYS Standards and Specifications for E&SC, and the E&SC details shown on the Construction Drawings and associated notes.

B. Stockpiles shall be covered when not in use.

2.2 SILT FENCE

A. Furnish silt fence materials as needed in accordance with the criteria listed in the NYS Standards and Specifications for E&SC and as shown on the Construction Drawings.

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise authorized by the Engineer.

Table 1
Minimum Requirements for Silt Fence

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	110	ASTM[1] D4632
Elongation at Failure (%)	20	ASTM D4632
Mullen Burst Strength (PSI)	300	ASTM D3786
Puncture Strength (lbs)	60	ASTM D4833
Minimum Trapezoidal Tear Strength (lbs)	50	ASTM D4533
Flow Through Rate (gal/ min/sf)	25	ASTM D4491
Equivalent Opening Size	40-80	US Std Sieve ASTM D4751
Minimum UV Residual (%)	70	ASTM D4355

[1] American Society for Testing and Materials

2. Fence Posts (for fabricated units): Fence post length shall be a minimum of 36 inches long. Wood posts shall be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts shall be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Prefabricated Silt Fence: Prefabricated products are acceptable as long as substantive material specifications are met, as determined by the Engineer.

2.3 COMPOST FILTER SOCK

A. Furnish materials as needed in accordance with the criteria listed in the NYS Standards and Specifications for E&SC and as shown on the Construction Drawings.

1. The filter sock shall consist of degradable geotextile mesh tubing filled with compost filter media.

2. If located on asphalt, the filter sock shall be anchored with sand bags or cinder blocks placed on the downslope side of the filter sock. The anchor system shall limit the movement

of the filter sock and trapped sediment. The Contractor may propose an alternate method for anchoring filter socks subject to approval by the Engineer.

2.4 STABILIZED CONSTRUCTION ENTRANCE

A. Inspect and maintain existing construction entrances to ensure compliance with criteria listed in the NYS Standards and Specifications for E&SC and details shown on the Construction Drawings.

1. Aggregate

   a. The aggregate layer shall consist of a matrix of 1 to 4 inch stone.

   b. Width and length shall be as show on the Construction Drawings. Construction entrance shall not be less than the full width of points where ingress or egress occurs.

2. Geotextile

   a. The area to be covered with aggregate shall be underlain with geotextile. Fabric shall be woven or nonwoven, consist of continuous chain polymeric filaments or yarns of polyester, and be inert to commonly encountered chemicals and hydrocarbons. The fabric shall be rot resistant and conform to the properties in Table 2.

Table 2
Minimum Requirements for Geotextile for Stabilized Construction Entrance

Fabric Properties[1]	Light Duty[2] Roads Grade Subgrade	Heavy Duty[3] 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	40-80	40-80	US Std Sieve
Aggregate Depth	6	10	-

[1] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

[2] Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[3] Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

2.5 TURBIDITY CURTAIN AND ANCHORING

A. Products required for the set-up and anchoring of the turbidity curtain include but are not limited to:

1. Two pilings installed to anchor the turbidity curtain (one on each side of the Canal at the entrance to the First Street Turning Basin), as depicted on the Construction Drawings;

2. Buoys to mark the construction zone; and

3. Automatic flashing lights.

B. The Contractor shall provide all products for the turbidity curtain as follows:

1. Curtain as shown on Construction Drawing G-501, or equivalent.
2. Anchoring load lines shall be a minimum 5/16-inch vinyl coated galvanized aircraft cable with 9,800-pound breaking strength. The load line shall have galvanized connectors with tool free disconnect.
3. Reefing lines shall be minimum ½-inch nylon rope.
4. Ballast shall be minimum 5/16-inch galvanized steel chain.
5. Additional anchorage shall be provided as necessary.

2.6 EQUIPMENT

A. Furnish equipment to perform E&SC measure installation and maintenance in accordance with this Section and the NYS Standards and Specifications for E&SC.

PART 3: EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Review the Construction Drawings.

B. Sign the Contractor Certification and provide contact information.

C. Verify existing conditions as shown on the Construction Drawings prior to beginning the Work in this Section.

D. Inspect the condition of existing E&SC devices for compliance with requirements listed in this Section and shown on the Construction Drawings.

E. Install E&SC measures prior to commencement of any other work activities in locations shown on the Construction Drawings and in accordance with this Section.

F. Inspect and certify newly installed E&SC measures in coordination with the Engineer.

G. Implement dust control in accordance with Section 01 57 19 – Temporary Environmental Controls.

H. Do not rely on the construction entrance to remove mud from vehicles, and prevent off-site tracking. Restrict vehicles that enter the Site from muddy areas or wash mud from vehicle exteriors, including tires and undercarriage, in a designated location approved by the Engineer before allowing the vehicles to leave the Site.

I. Maintain the construction entrance in a condition that will prevent tracking or flow of mud onto public rights-of-way.

J. Immediately remove materials spilled, dropped, washed, or tracked onto roadways or into storm drains by scraping or sweeping.

K. Under no circumstances shall water trucks be used to remove materials spilled, dropped, washed, or tracked onto roadways.

L. Clean, maintain, repair, and replace E&SC measures for the duration of the Work. Sediment that is removed from E&SC measures shall be disposed of in accordance with Section 02 51 19 – Excavated Material and Waste Management.

M. At the end of the Work, remove, transport and dispose of materials and debris associated with E&SCs in accordance with Section 02 51 19 – Excavated Material and Waste Management and as directed by the Engineer. Material shall be disposed or recycled in accordance with all Federal, State, and local laws, codes, and ordinances.

3.2 TURBIDITY CURTAIN AND ANCHORING INSTALLATION

A. Prior to commencement of intrusive activities, the Contractor shall install anchor pilings as shown on the Construction Drawings. The pilings will serve as anchor points for the turbidity curtain system. The turbidity curtain shall not be affixed to any bulkhead.

1. The pilings shall be of sufficient strength and installed to sufficient depth to support the turbidity curtains without attachment to the bulkhead.

2. The pilings shall be installed so there is minimal gap between the piling and the bulkhead. The Contractor shall include a contingency in their design such that if an excessive gap is present following installation of the pilings, a turbidity curtain or other barrier approved by the Engineer shall be installed between the piling and bulkhead to eliminate the gap.

B. During progress of the Work, and as the Canal becomes usable by water, the Contractor may move the turbidity curtain eastward (i.e., within the First Street Turning Basin) to facilitate sequencing of the Work and movement of equipment within the Canal.

C. Turbidity curtain shall be used for the duration of the construction activities, including material removal, bulkhead/sheet pile installation, and cap placement.

1. Absorbent oil booms shall be placed on the terminus-side of the turbidity curtain any time the turbidity curtain is deployed.

2. If an exceedance of the threshold turbidity criteria is observed during the Work, the Contractor shall implement water quality controls in accordance with Section 01 57 19 – Temporary Environmental Controls, including but not limited to slowing or halting operations, modifying operational procedures, and modifying turbidity control measures.

3. If, upon inspection, it is determined that any part of the turbidity curtain is damaged or no longer functional, it must be repaired or replaced prior to continued construction activities.

4. If observed, the Contractor shall collect, remove, and dispose of floating debris and visual surface oil sheen collected in the turbidity curtain system. The Contractor shall drum spent absorbent materials and transport them for disposal or to the Staging Area for temporary off-loading and on-site storage.

5. When the turbidity curtain system is no longer required, as determined by the Engineer following completion of the Work, the pilings, curtains, and related components shall be removed in such a manner as to minimize turbidity. The Contractor is responsible for the removal and disposal of the turbidity curtains and related components.

D. Buoys shall be installed to mark locations of pilings and turbidity curtains.

E. Automatic flashing lights shall be affixed on top of the pilings and to the turbidity curtain, which will operate from dusk until dawn.

3.3 INSPECTIONS

A. The Contractor shall conduct a Site inspection at least once every seven (7) calendar days. Inspection shall be performed by a qualified inspector and documented in accordance with this Section.

B. The Contractor is responsible for conducting daily inspections of E&SC practices and pollution prevention measures being implemented within the active work area to ensure that they are being maintained in effective operating condition. Daily inspections shall be performed by a trained contractor, as defined in the Construction Drawings and documented in accordance with this Section.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section establishes the requirements for temporary environmental controls to minimize emissions and discharges from the Site.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites

C. Section 01 51 00 – Temporary Utilities

D. Section 01 57 13 – Temporary Erosion and Sediment Control

E. Section 02 51 19 – Excavated Material and Waste Management

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. Rules of the City of New York (RCNY). "Title 15: Department of Environmental Protection." <http://rules.cityofnewyork.us/codified-rules?agency=DEP>.

2. New York City Administrative Code (NYCAC). "Title 24: Environmental Protection and Utilities." <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO:>.

3. AKRF-KSE JV 2019. Community Air Monitoring Plan.

4. Wilson Ihrig, October 2015. "Gowanus Canal Remedial Design Project Brooklyn, New York, RTA-1 and TB-4 Noise and Vibration Baseline Report."

5. Wilson Ihrig, December 2016. "Noise Monitoring Report for Gowanus Canal Remedial Design Project TB-4 Debris Removal Pilot Study."

6. Geosyntec, 2017. "Project Completion Report, Debris Removal Pilot Study, 4th Street Turning Basin, Gowanus Canal."

7. Standards and regulations contained in Title 40, Code of Federal Regulations, including, but not limited to:

a. Part 110 "Discharge of Oil";

b. Part 117 "Determination of Reportable Quantities for Hazardous Substances"; and

c. Part 302 "Designation, Reportable Quantities, and Notification."

1.4 SUBMITTALS

A. The Contractor shall prepare several submittals for the Engineer associated with proposed plans for temporary environmental controls. Plans shall be submitted to allow for a minimum of 30 days for EPA's review, and any comments/concerns will be addressed before proceeding with

the associated Work. Submittals to be prepared by the Contractor in accordance with Section 01 33 00 – Submittal Procedures include:

1. A Construction Noise Mitigation Plan that meets the requirements set forth in RCNY Title 15, Chapter 28: "Citywide Construction Noise Mitigation" including, but not limited to:
    a. Construction devices to be used;
    b. Noise mitigation barriers to be used; and
    c. Means and methods for implementing operational controls and/or noise barriers to mitigate construction-related noise as required.
2. A Construction Air Emissions and Odor Control Plan including, but not limited to:
    a. Types of foaming odor suppressants to be used;
    b. Types of air emissions controls to be used;
    c. Means and methods for implementing operational and/or physical air emissions and odor controls as required; and
    d. A contingency plan if odor thresholds are reached.
3. A Water Quality Control Plan including, but not limited to:
    a. Types of water quality controls to apply to prevent and mitigate exceedances of water quality monitoring criteria as defined in this Section; and
    b. Means and methods for implementing operational and/or physical water quality controls as required.
4. A Dust Control Plan that meets the requirements set forth in RCNY Title 15, Chapter 13: "Rules Pertaining to the Prevention of the Emission of Dust from Construction Related Activities" including, but not limited to:
    a. Means and methods to control dust during construction activities and transport of materials.
5. A Spill Prevention and Control Plan including, but not limited to:
    a. Procedures, instructions and reporting requirements in the event of an unforeseen leak, spill, or other release containing a substance regulated under State or local laws and/or a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 Code of Federal Regulations (CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302);
    b. Contact information for the person responsible for reporting spills or releases of hazardous materials, and the chain of command for reporting this information to the Engineer and legally required emergency response authorities, regulatory agencies, EPA, and other reporting channels;
    c. Contact information for the person responsible for implementing spill response measures;
    d. Training requirements for personnel who will be responsible for implementing cleanup;
    e. A list of materials and equipment to be made available on-site for containment and potential cleanup of spilled materials;

f. Means and methods to prevent, control and clean spills of materials stored on-site or on barges; and

g. Means and methods to clean up soils and/or water contaminated due to malfunction of the Water Treatment System (WTS) (e.g., overflow or spills).

1.5 HEALTH AND SAFETY REQUIREMENTS

A. The Contractor shall comply with environmental health and safety/training requirements in accordance with the approved Health and Safety Plan and Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

PART 2: PRODUCTS

2.1 MATERIALS

A. Materials covered under this Section shall include but not be limited to the following items:

1. Water. The Contractor shall provide sufficient water for controlling dust emissions. Water may be obtained from a New York City fire hydrant adjacent to the Site following proper permitting according to Section 01 51 00 – Temporary Utilities.

2. Sediment and erosion controls. The Contractor shall furnish materials for sediment and erosion control devices according to Section 01 57 13 – Temporary Erosion and Sediment Control and the sediment and erosion control details shown on the Construction Drawings and associated notes.

3. Noise barriers. The Contractor shall furnish appropriate materials for minimizing work-related noise as outlined in this Section.

4. Air emissions and odor control. All debris, and any excavated material stockpiles, shall be covered with a minimum 6-mil polyethylene tarp while staged overnight. In addition, at all times, the Contractor shall furnish odor suppressant foams described below and appropriate equipment for controlling air emissions and odors associated with debris and sediment removed from the Canal. The Contractor may propose an alternate foam product, subject to approval by the Engineer. The Contractor shall dispense foam according to the manufacturer's recommended instructions.

   a. The Contractor shall furnish a fast-acting odor suppressant foam for immediate short term mitigation of odors such as RusFoam® OC (AC-645) (RusMar Foam Technologies, Incorporated).

   b. The Contractor shall furnish a long-duration odor suppressant foam for long- term mitigation of odors such as RusFoam® LM (RusMar Foam Technologies, Incorporated).

5. Water quality control. The Contractor shall furnish appropriate materials for controlling turbidity in the Canal in accordance with this Section and the turbidity curtain detail shown on Construction Drawing S-3 and associated notes.

6. Spill response kit. The Contractor shall maintain a spill response kit on-site at all times (including all vessels) of sufficient size to contain and absorb the capacity of the largest fuel or hydraulic fluid tank of the Contractor-provided equipment.

7. Spill control materials. The Contractor shall furnish appropriate materials for controlling and cleaning spills from material storage containers and/or the WTS.

2.2 EQUIPMENT

A. The Contractor shall provide all equipment to perform the activities associated with temporary environmental controls including, but not limited to:

1. Pumps, hoses, and other water handling equipment used for dust control;
2. Water truck(s) or other equipment needed to provide dust suppression independent of moisture conditioning activities; and
3. Equipment for deploying environmental controls.

PART 3: EXECUTION

3.1 DUST CONTROL

A. The Contractor shall perform dust control throughout the project's duration to prevent the occurrence of dust. As necessary or otherwise directed by the Engineer, clean water (e.g., hydrants, imported tankers) shall be applied to the surfaces of haul roads and work areas when equipment is moving about the Site in order to control dust in accordance with the Community Air Monitoring Plan (CAMP) (AKRF-KSE JV 2019). At no time is Canal water acceptable for use during dust control activities.

B. Particulate matter transported in trucks and other vehicles shall be covered when being transported and any particulate matter delivered to or kept on-site shall be sufficiently managed to prevent particulate matter from becoming airborne.

C. The Contractor shall control dust during material handling in accordance with Section 02 51 19 – Excavated Material and Waste Management.

3.2 NOISE CONTROL

A. Noise monitoring will be performed by the Engineer to measure Equivalent Noise Levels (Leq) (e.g. an hourly "average" of sound level) and Maximum Sound Levels (Lmax) (e.g. the highest sound level that occurs during the time period of measurement). Noise limits for Leq and Lmax for various times and receptors are provided in Table 1 below. The Contractor shall be prepared to implement appropriate noise controls in response to monitoring data in accordance with the approved Construction Noise Mitigation Plan and this Section.

Table 1
Allowable Equivalent Noise Levels and Maximum Noise Levels

Land Uses	Equivalent Noise Level[a] – Leq dBA (whichever is greater)	Lmax Level – dBA, slow
Daytime (7AM to 6PM)		
Residences and buildings where people normally sleep	75 or Background + 5[a]	85[e] 90 (impact equipment)
Commercial Areas	80 or Background + 5[a]	None
Industrial Areas	80 or Background + 5[a]	None
Evening (6PM to 10PM)		
Residences and buildings where people normally sleep	65 or Background + 5	85
Commercial Areas	80 or Background + 5	None
Industrial Areas	80 or Background + 5	None
Nighttime (10PM to 7AM)	No nighttime work planned	
Residences If background < 70 dBA If background ≥ 70 dBA	 Background + 5 Background + 3	 80 80
Commercial Areas	None	None
Industrial Areas	None	None
Weekend (Sat. 7AM to 6PM)	No Weekend work planned	
Residences and buildings where people normally sleep	65 or Background + 5	85
Commercial Areas	80 or Background + 5	None
Industrial Areas	80 or Background + 5	None
Weekend (Sat. 6PM to Mon 7AM)	No Weekend work planned	
Residences If background < 70 dBA If background ≥ 70 dBA	 Background + 5 Background + 3	 80 80
Commercial Areas	None	None
Industrial Areas	None	None

Notes:
a) Noise level limits based on total noise level due to construction noise combined with typical ambient conditions
b) All measurements taken at the affected lot-line and at least 50 feet from construction activity being measured
c) Noise level limits based on hourly intervals
d) Lmax noise level limits are the maximum noise level that occurs over hourly intervals
e) Noise from impact equipment may be exempt from the Leq recommendation, however is subject to a lot line Lmax limit of 90 dBA

B. Perform noise-producing work in accordance with RCNY Title 15, Chapter 28: "Citywide Construction Noise Mitigation" and NYCAC Title 24, Chapter 2: "Noise Control."

C. Noise-producing work may occur between the hours of 7:00 AM and 6:00 PM local time on weekdays, unless authorized in accordance with procedures outlined in RCNY Title 15, Chapter 28.

D. In the event of a noise complaint or specific exceedance, the Contractor shall respond in accordance with RCNY Title 15, Chapter 28 and NYCAC Title 24, Chapter 2.

3.3 AIR EMISSIONS AND ODOR CONTROL

A. Air emissions and odor will be monitored by the Engineer in accordance with the CAMP (AKRF-KSE JV 2019) prior to and during dredging and capping operations. Exceedances of action levels will be communicated to the Contractor by the Engineer or their delegate. The

Contractor is responsible for implementing air emissions and odor controls in response to specific exceedances. The nature and extent of corrective measures will be determined based on consultation with the Engineer. Corrective measures may include, but are not limited to:

1. Modifying operating procedures;
2. Installing additional engineering controls;
3. Modifying equipment used for construction activities;
4. Adjusting application rate of odor control materials; and
5. Slowing or suspending construction activities until air quality is restored to below applicable threshold criteria.

B. Odor Suppressant Foam

1. Odor suppressant foam shall be available for use to control air emissions and odor. At a minimum, foam shall be available for daily application for the duration of material removal activities to areas where removed debris and soil/sediment are located. Additional foam shall be applied as needed to maintain compliance with air emissions and odor thresholds defined in the CAMP (AKRF-KSE JV 2019).

C. Water Treatment System Air Emission and Odor Control

1. The Contractor shall use Best Management Practices (BMPs) to control odors, which include but are not limited to:
    a. Reducing odor production via disinfection to control bacteria growth;
    b. Reducing odor and air emission transmission by installing closed-top tanks or removable covers to cover tanks; and
    c. Odor masking or counteraction only used as a stop-gap measure.

3.4 WATER QUALITY CONTROL

A. Water quality in the main portion of the Canal will be monitored by Engineer prior to and during material removal and capping operations. Exceedances of threshold levels will be communicated to the Contractor by the Engineer, and the Engineer will communicate trigger criterion exceedances (if any) to EPA as part of the normal work reporting process and will communicate action criterion exceedances (if any) to EPA as soon as practicable after the occurrence. A turbidity buoy, referred to herein as a sentinel buoy, will be present in the main portion of the Canal to monitor water quality in proximity to in-waterway construction activities just outside deployed engineering controls. A turbidity buoy, referred to herein as an ambient buoy, will be deployed away from in-waterway construction activities. The Contractor shall avoid damaging water quality equipment or interfering with the operation of such equipment.

B. The following threshold criteria will be applied to all in-waterway construction activities.

1. The Trigger Criterion shall be reached if any of the following apply:
    a. The rolling average of the sentinel buoy turbidity measurements over a one hour period exceeds the rolling average of the ambient buoy turbidity measurements by 20 Nephelometric Turbidity Unit (NTU); or
    b. Either an oil sheen or turbidity plume is visually observed outside of engineering controls and in-waterway construction activities cannot be immediately excluded as the source.

2. The Action Criterion shall be reached if any of the following apply:

   a. The rolling average of the sentinel buoy turbidity measurements over a one hour period exceeds the rolling average of the ambient buoy turbidity measurements by 40 NTU; or

   b. Either an oil sheen or turbidity plume is visually observed outside of engineering controls and in-waterway construction activities are readily identified as the source.

C. The Contractor shall be prepared to implement appropriate operational and water quality control measures if an exceedance of the threshold criteria for turbidity or oil sheen is observed. Operations will not be stopped due to an exceedance of the Trigger Criterion. Should an exceedance of the Trigger Criterion be reached, the Contractor shall evaluate BMPs and begin implementing corrective actions as appropriate. Should an exceedance of the Action Criterion be reached, the nature and extent of the corrective measures will be determined based on consultation with the Engineer. Corrective measures are to be outlined in the Contractor Water Quality Control Plan and may include, but are not limited to:

   1. Repairing, modifying, and/or installing additional engineering controls such as turbidity curtains or absorbent booms in accordance with Section 01 57 13 – Temporary Erosion and Sediment Control;

   2. Modifying equipment used for the in-waterway construction activities;

   3. Adjusting BMPs; and

   4. Slowing or suspending in-waterway construction activities until Canal water quality is restored to below applicable threshold criterion.

3.5 SPILL CONTROL

A. The Contractor shall prevent and control spills in accordance with this Section.

B. The Engineer shall be notified immediately of any spills of hazardous materials. Once detected, spills should be cleaned immediately and waste materials properly disposed.

3.6 SEDIMENT AND EROSION CONTROL

A. The Contractor shall perform sediment and erosion control in accordance with Section 01 57 13 – Temporary Erosion and Sediment Control and the Construction Drawings.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 71 23.16

CONSTRUCTION SURVEYING

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section summarizes the surveying requirements for completion of the Work.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES

A. The following standards and references are used in this Section:

1. Hydrographic Surveying Engineering Manual, EM 1110-2-1003 prepared by United States Army Corps of Engineers (USACE) in 2013. The most recent version of this reference applies.

2. National Geodetic Standards (NGS). Accessed 10 April 2017.

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval, in accordance with Section 01 33 00 – Submittal Procedures.

1. Survey Plan: The Contractor will submit a Survey Plan for review and approval by the Engineer and EPA 30 days prior to the start of any survey work. The Survey Plan will include the following:

a. A schedule for all survey work and drawings that show the track-lines for each bathymetric survey;

b. Bathymetric survey instrument calibration certificates and specifications;

c. Specifications for all proposed bathymetric survey equipment; and

d. Name, address, telephone number, and qualifications, including licensure and/or certification, of the surveyor, crew chief, superintendent, and all other persons who are proposed to perform surveys or survey related duties.

2. Copies of the surveyor's notes and calibration documentation for surveying equipment when drawings are provided for upland and capping surveys.

3. Survey data, provided in x, y, z (easting, northing, elevation) format. Each data file must include a descriptive header including, but not limited to: software and equipment information, project name and client, horizontal and vertical datum, units, survey type, alignment, and stations surveyed.

4. The Surveyor's License.

5. Initial record survey drawings.

6. Progress record survey drawings.

7. Final record survey drawings.

1.5 SURVEYOR REQUIREMENTS

A. The Contractor's land surveyor shall be a State of New York-licensed Professional Land Surveyor.

B. The surveyor shall comply with environmental health and safety/training requirements in accordance with Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 SURVEY WORK

A. The surveyor shall maintain accurate and complete notes as follows:

1. Legibly recorded handwritten survey field notes. Survey monuments and benchmarks shall be identified on the field notes, sketches, and drawings.

2. Submit electronically-collected field survey information within one week of performing the Work as a ".dwg" file (compatible with AutoCAD), along with an electronic PDF of the drawing (compatible with Adobe Acrobat).

B. The surveyor shall maintain field documentation for the surveys as follows:

1. Record the following information in survey notes for each control point established:

a. Designation of control point;

b. Grid coordinate system corresponding to State Plane North American Datum (1983) New York East;

c. Elevations in feet recorded in the North American Vertical Datum of 1988 (NAVD88);

d. Date of establishment;

e. Description and sketch of the control point location; and

f. Control points referenced to a minimum of three features that can be observed from the control point.

2. Document survey work in the notes using the format and methods described below:

a. Title and consecutive field notes numbered on the front cover;

b. Consecutively numbered pages;

c. Table of contents, indicated by survey task, on the first numbered page;

d. Legend indicating symbols used in survey notes;

e. Names of survey team for each task;

f. Notes on weather, equipment, and other field conditions;

g. Date and time on each page to indicate when the Work was recorded;

h. Notes in a uniform character such that they can be interpreted and used by anyone with knowledge of surveying; and

i. Description and/or sketches of the existing survey control used.

C. As-built and record survey drawings shall be stamped and signed by the licensed surveyor.

D. Progress surveys shall generally conform to industry standards as to quality and information shown.

E. The scope of the survey requirements are provided within Section 35 43 00 – Cap Construction, Section 31 63 34 – Drilled Steel Pipe Piles, and Section 31 09 13 – Geotechnical Instrumentation and Monitoring. The following surveys will be required:

1. Initial record survey drawings. The drawing contour or bathymetric interval shall be 0.5 feet and the scale shall be 1-inch=40-feet or as appropriate for the drawing scale. Initial record survey drawings shall be compatible with existing Construction Drawings and shall be used to verify initial Site conditions for the purpose of items such as calculating final cut and fill volumes and verifying the location of utilities or structures.

2. Progress record survey drawings to document the progression of construction activities and specific components of the project shall clearly show the area requiring documentation. The progress record survey drawings shall also show the horizontal and vertical limits of the area and provide sufficient information to clearly locate the area and perform calculations to record quantities. The progress record survey drawings shall be at the same drawing contour or bathymetric interval, scale, and of the same areas as the initial record survey drawings.

3. Final record drawings and as-built survey drawings shall document the final condition of the Site after completion of the Work. The final record survey drawings shall be at the same drawing contour or bathymetric interval, at the same scale, and of the same area as the initial record survey drawing, and shall be compatible with the initial drawing in the level of detail shown and the manner of presentation, so that the drawings can be easily compared. Record surveys associated with Project Closure shall be submitted in accordance with Section 01 78 00 – Contractor Closeout Submittals.

3.2 CONTROL POINTS AND PERMANENT MONUMENTS

A. The Contractor shall establish temporary survey control points to support construction work activities.

B. Marine control points for cap placement shall be established by the Contractor.

C. The precision of horizontal and vertical control points for:

1. Upland areas: shall conform to or exceed Third-Order Class I and Third-Order accuracies, respectively, as defined by NGS Standards.

2. Underwater work: cap placement shall have horizontal and vertical accuracies of +/-0.50-feet and 0.50-feet, respectively.

D. The Contractor shall safeguard all points, stakes, grade marks, monuments and benchmarks made or established for the Work, re-establish same (if disturbed), and bear the entire expense of rectifying work due to not maintaining, not protecting, or removing without authorization such established points, stakes, marks and monuments.

3.3 UPLAND SURVEYS

A. For upland surveys described in Section 31 10 00 – Site Preparation, the horizontal and vertical accuracy shall be +/- 0.30 foot.

B. Report elevation and horizontal coordinates to the nearest 0.01 foot and to the nearest 20 seconds for angles.

C. Perform construction layout surveys in advance of scheduled construction activities. The surveyor shall be responsible for rework and/or construction delays caused by survey or staking errors.

3.4 HYDROGRAPHIC SURVEYS

A. Bathymetric survey accuracy shall be in accordance with the USACE Hydrographic Surveying Engineering Manual.

B. The Contractor shall verify surveying equipment is accurate on a weekly basis, making modifications to equipment as necessary.

C. The following methodology shall be used for editing and sorting hydrographic surveys:

1. Surveys shall be sorted to a 3-foot by 3-foot grid (bin size);
2. Two sets of sorted hydrographic surveys shall be saved (average and minimum [shallowest] soundings);
3. Soundings shall be recorded to the nearest tenth (0.1) of a foot;
4. All hydrographic surveys shall present the minimum soundings; and
5. All final volumes for excavation and cap placement shall be calculated using hydrographic surveys with the average soundings.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 78 00

CONTRACTOR CLOSEOUT SUBMITTALS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section describes the requirements for all final record documents.

1.2 RELATED SECTIONS

A. All Technical Specifications and Construction Drawings are related to this Section.

1.3 REFERENCES (NOT USED)

1.4 PAYMENT

1.5 SUBMITTALS

A. The Contractor shall submit the following to the Engineer in accordance with Section 01 33 00 – Submittal Procedures.

1. Signed warranties and certifications.

2. A Project Closeout set of Record Drawings showing the original design and all changes made during construction, including:

a. As-Built drawings to include actual dimensions and elevations of significant features, including pipe pile locations, pipe pile tip and cut-off elevations, bulkhead cap, and fencing;

b. All field changes to dimensions, details, and elevations;

c. All details not shown on the original drawings; and

d. Post-construction existing building condition assessments and a final monitoring report, in accordance with Section 31 09 13 – Geotechnical Instrumentation and Monitoring.

3. Record documents including, but not limited to, progress surveys, records of waste and recyclables generated, records of material imported for backfilling and capping, and documentation of any inspections or testing completed.

4. Maintenance/operation manuals as specified.

5. Work photographs and videos.

6. A final payment request with supporting documentation.

1.6 RECORDS

A. The Contractor shall submit all closeout documents in paper and electronic formats, in accordance with this Section.

B. As-Built drawings shall be submitted in AutoCAD format (2016 or newer) and will be bound to include all related matter (e.g. base files, font files and shapes). Each file shall be viewable and printable in its entirety without recourse to external files.

C. The Contractor shall use the information compiled during construction to create an As-Built Drawing Set. The Contractor shall document any deviations, changes, etc. from the original Construction Drawings or revised drawings issued during the course of executing the Work, including Change Orders, Design During Construction (DSDC) memorandums, Requests for Information (RFIs), Requests for Clarification (RFCs), etc. All deviations, changes, etc. shown must be field verified.

D. Drawing size: The As-Built drawings are to be the same size as the full size Construction Drawings.

E. The As-Built drawing number is the original Construction Drawing number prefixed by an "AB" for As-Built.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 SUBSTANTIAL COMPLETION

A. The following are prerequisites to substantial completion:

1. Leave the Site clean of rubbish and ready for use;

2. Treat and remove all debris, sediment, and water in accordance with Sections 02 51 19 – Excavated Material and Waste Management and Section 44 08 40 – Water Treatment System Requirements;

3. Remove temporary erosion and sediment controls;

4. Remove all equipment (including the Water Treatment System), materials, tools, and supplies, unless approved in writing by the Engineer and EPA; and

5. Restore Staging Site to pre-construction conditions.

3.2 PROGRESS INSPECTIONS

A. The Contractor shall notify the Engineer in writing when demobilization occurs of equipment that will not be maintained on-site to project completion.

B. The Engineer will prepare and submit to the Contractor a punch list of items to be completed or corrected prior to demobilization of specified equipment. The Engineer will review the completed punch list with the Contractor and establish a timeframe for completion and correction.

C. The Contractor shall take immediate steps to remedy the listed deficiencies and notify the Engineer in writing that the tasks are complete and ready for progress inspection. Equipment shall not be demobilized without the approval of the Engineer and EPA.

3.3 FINAL INSPECTION

A. The Contractor shall notify the Engineer in writing when the Contractor believes the Work is substantially complete.

B. The Engineer will prepare and submit to the Contractor a punch list of items to be completed or corrected. The Engineer will review the completed punch list with the Contractor and establish a timeframe for completion and correction.

C. The Contractor shall take immediate steps to remedy the listed deficiencies and notify the Engineer in writing that the project is complete and ready for final inspection.

D. The Contractor shall conduct a final Site inspection with the Engineer prior to completion of the Contractor's demobilization to verify the following items:

1. Completion of items listed in Part 3.1.A of this Section; and

2. Completion of punch list. The punch list will be created prior to project closeout by the Engineer and EPA.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02 51 00

DECONTAMINATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section discusses decontamination procedures. The Contractor is responsible for:

a. The decontamination of all vehicles, equipment, and personnel that come into contact with excavated or impacted materials at the Site;

b. The construction and maintenance of decontamination areas; and

c. Furnishing all materials, equipment, and labor necessary to construct and maintain decontamination areas and to decontaminate vehicles, equipment, and personnel.

1.2 RELATED SECTIONS

A. Section 01 32 01 – Construction Progress Documentation

B. Section 01 33 00 – Submittal Procedures

C. Sections 02 51 19 – Excavated Material and Waste Management

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (October 1985), as prepared by the National Institute of Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), United States Coast Guard (USCG), and United States Environmental Protection Agency (EPA).

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures:

1. Decontamination Work Plan: Decontamination measures including description of facilities and procedures for decontamination of trucks, construction equipment (including barges and other equipment in contact with sediments, processed dredged material, decant water, leachates, and surface water runoff) and rented facilities (such as road mats and water treatment equipment) before they leave the Site. The discussion shall also include methods for containment and management of wastes resulting from these activities.

2. Equipment Decontamination Documentation Report and Certification. Submit an Equipment Decontamination Documentation Report and Certification to the Engineer prior to the demobilization of any equipment that has contacted impacted materials. The Equipment Decontamination Documentation Report shall include a description of decontamination procedures and the results of inspection and testing.

B. Informational Submittals

1. Safety Data Sheets for all cleaning/decontamination solutions shall be submitted to the Engineer a minimum of 14 days prior to the cleaning/decontamination solution being brought on-site.

2. Daily Progress Reports. Include a Decontamination Status Report as part of the Daily Activities Reports prepared in Section 01 32 01 – Construction Progress Documentation. The Decontamination Status Report shall document all equipment and vessels that have undergone decontamination procedures and include the following, at a minimum:

   a. A description of the decontamination status for each piece of equipment, including whether it has come in contact with impacted materials; and

   b. Whether the status of a piece of equipment has changed from handling impacted materials to non-impacted materials.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 GENERAL REQUIREMENTS

A. All construction vehicles leaving the work area shall be decontaminated by the Contractor (as necessary) to prevent the tracking of soil off-site (including vehicles transporting clean fill to the Site). Vehicles and equipment that come into contact with excavated or impacted materials at the Site shall be visually inspected and decontaminated by the Contractor (to the satisfaction of the Responsible Parties, the Engineer, and/or EPA) within the equipment decontamination area prior to handling backfill material or leaving the Site. Any visible soils or other debris shall be promptly removed and disposed of in a manner consistent with the materials excavated.

B. Precautions shall be taken to limit contact between the vehicle/equipment, personnel performing the decontamination activities, and any decontamination liquids that may accumulate in the decontamination area. Personnel engaged in decontamination activities shall use personal protective equipment, including disposable clothing, as required by the Contractor's Health and Safety Plan (HASP).

C. Wash water, solids, and other materials generated during decontamination activities shall be collected by the Contractor and handled/managed in accordance with Sections 02 51 19 – Excavated Material and Waste Management. Accumulated liquids shall be removed by the Contractor on a periodic basis so as to not exceed the capacity of the decontamination area.

D. Water used for decontamination of components of the Water Treatment System (WTS) after decommissioning of the WTS shall be captured and properly discarded off-site in accordance with Federal, State, and local regulations. All other equipment must be decontaminated prior to decommissioning of the WTS.

E. Potable water shall be used for decontaminating equipment. The outsides of barges and other equipment shall be kept clean to prevent the release of sediment into the Canal.

3.2 DECONTAMINATION AREAS

A. The Contractor is responsible for constructing and maintaining decontamination area(s) to accommodate all loads, vehicles, equipment, and migration scenarios.

B. The Contractor is responsible for constructing the decontamination area at the locations shown on the Construction Drawings. Alternative locations shall be approved by the Responsible Parties and/or the Engineer prior to construction.

C. Vehicle/equipment decontamination areas shall be constructed as specified on the Construction Drawings. Alternate decontamination area configuration/construction shall be approved by the Engineer prior to construction.

D. The Contractor shall construct and maintain appropriately-sized decontamination areas for its personnel. Personnel decontamination areas shall be located within the contamination reduction zone and include those facilities necessary to decontaminate personnel upon exiting the work area (exclusion zone), in accordance with the Contractor's HASP, and in accordance with Federal, State, and local laws and regulations. At a minimum, personnel decontamination areas shall include run-on/run-off controls.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02 51 19

EXCAVATED MATERIAL AND WASTE MANAGEMENT

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section describes the Contractor's responsibilities for excavated soil solidification/stabilization (S/S), thermal treatment (if required), and transport to an end-use facility; waste management [including management of debris, waste generated in the water treatment system (WTS), and Other Waste generated during the Work].

1.2 RELATED SECTIONS

A. Section 02 51 00 – Decontamination

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. New York City Department of Design and Construction, 2003. "Construction & Demolition Waste Manual."

2. United Stated Environmental Protection Agency (EPA) March 2005. "Uniform Federal Policy for Quality Assurance Project Plans. Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs; Part 1: UFP-QAPP Manual." https://www.epa.gov/sites/production/files/documents/ufp_qapp_v1_0305.pdf

1.4 DEFINITIONS

A. Debris – Material separated from Excavated Soils during the material separation process or any object (wood, concrete, tires, plastic, rocks, rubbish, etc.) greater than 6 inches that is not considered Excavated Soil.

B. Drill Spoils – Solids and liquids generated during installation of drilled piles, including soil, liquids, and debris.

C. Excavated Soil – Material removed from the excavation footprint which passes through the material separation process. In the context of this Section, Excavated Soil also includes any waste materials generated and categorized as Drill Spoils.

D. In-barge S/S Mixing – The process of mixing the solidification/stabilization Reagent in-barge at the dosage selected to meet the acceptance criteria for beneficial use end-placement.

E. Other Waste – Waste generated from day-to-day operations (e.g. office rubbish/recycling) to be regularly collected and removed from the Staging Site.

F. Processed Excavated Material (PEM) – Excavated Soil which has been treated (via S/S and potentially thermal desorption) to meet the acceptance criteria for beneficial use end-placement.

G. Reagent – Type I or Type II Portland cement, or an alternative as proposed by the Contractor, used for soil S/S.

H. Solidification/stabilization (S/S) – The processing of soil through addition of Reagent and mixing of Reagent with Soil to obtain a homogenous material.

I. Thermal treatment – The processing of soil through off-site thermal desorption.

J. Treatment – May refer to S/S with Reagent at the selected dosage to meet the acceptance criteria for beneficial use end-placement, S/S with Reagent at the selected dosage to pass Paint Filter Liquids Test (EPA SW-846 Method 9095A) required for truck transportation, or thermal treatment.

K. WTS – The water treatment system installed at the Staging Site at 450 Carroll Street.

L. Water Treatment System Waste – Waste generated from the WTS including solid waste and sludges, oil from the oil/water separator, and spent treatment media.

M. Wash Water – Collected water used to wash Debris, the lined pad, and any separate decontamination pad.

1.5 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures. Plans will be submitted to allow for a minimum period of 30 days of EPA review, and any EPA comments/concerns shall be addressed before proceeding with the associated Work.

1. Materials Management Plan (MMP)

a. The Contractor shall describe the sequencing, details, and means and methods for excavated material and drilling spoils management including, but not limited to, the following information:

1) A schedule and flow chart showing excavated soil S/S, temporary storage at the Staging Site (if planned), thermal treatment activities, and end-placement (both those performed by the Contractor and those performed off-site); throughputs and hold times associated with processing, laboratory testing, and end-placement; and decision points, reprocessing activities, and their inter-relationship to demonstrate adequate process capacity.

2) An equipment list, including all equipment to be used for in-barge mixing; soil and drilling spoils handling; and transport of excavated soil/drilling spoils for off-site S/S and/or off-site thermal treatment, and end placement.

3) A detailed description of equipment, methods and techniques for In-barge S/S Mixing including:

a) A detailed description of means and methods for mooring barges used for mixing and transporting PEM off-site. The Contractor shall include a drawing with the layout of all proposed vessels for In-barge S/S Mixing.

b) A detailed description of S/S Reagents, mix design formulation and equipment, and means and techniques for the introduction and mixing of S/S Reagents. The Contractor shall provide a plan using Type I or II Portland cement as the S/S Reagent. In addition, the Contractor may also submit a value engineering proposal indicating an alternative mix design using alternative Reagent(s), if, based on the judgement of the Contractor, the use of the alternative Reagent would provide engineering value. The Contractor shall provide justification for use of the alternative Reagent(s).

c) A detailed description of equipment, methods, and techniques for transporting and off-site unloading of PEM.

d) A detailed drawing indicating Reagent staging areas and storage locations of material handling equipment at the Staging Site.

e) A detailed description of dust mitigation techniques while receiving and stockpiling/storing Reagent at the Staging Site.

f) A detailed description of equipment and means and methods of dust control, including manufacturer's specifications for a spray bar or other misting system equipment to be used for controlling dust, and breathing zone air monitoring during In-barge S/S Mixing.

g) A procurement plan for acquiring S/S Reagent.

4) A detailed description of equipment, methods, and techniques for off-site S/S associated with excavated materials and drilling spoils including:

a) The name, location, relevant points of contact, telephone numbers, and a copy of the permit or license of the off-site soil processing facility selected by the Contractor. Note, if off-site mixing becomes necessary, the exact location has not yet been identified. The proposed location shall be provided to the Engineer along with other Contractor submittals for Engineer and EPA review and approval a minimum of 30 days prior to construction mobilization.

b) Acceptance criteria of the selected off-site soil processing facility.

c) A detailed description of equipment, methods, and techniques for transporting and off-site unloading of Excavated Soil.

d) A detailed description of mix design including equipment, means, and techniques for the introduction and mixing of S/S Reagents performed at the off-site soil processing facility. The Contractor shall provide a mixing plan assuming Type I or II Portland cement will be the S/S Reagent. In addition, the Contractor may also submit a value engineering proposal indicating an alternative mix design using an alternative Reagent, if, in the judgement of the Contractor, the use of the alternative Reagent would provide engineering value.

e) A site layout of the off-site soil processing facility that shall include a detailed description of the dedicated low-permeability pad areas for PEM stockpiling and staging, all soil and erosion control measures, construction access roads to accommodate material re-handling, and a temporary retention basin, as appropriate. Show how runoff will be collected, stored, and treated prior to discharge.

f) A description of the PEM loadout operations and measures taken to prevent cross-contamination and/or tracking of PEM onto roadways by haulers as they leave the off-site processing facility.

5) A Waste Characterization Sampling Plan for compliance of sampling requirements for acceptance at the off-site soil processing facility, thermal treatment facility, and end-placement facility.

6) A facility list including the names, locations, relevant points of contact, telephone numbers, and a copy of the permit or license for the acceptable end-placement facilities selected by the Contractor.

7) Acceptance criteria of the selected end-placement facilities.

8) Ullage tables for barges containing Excavated Soil to be used for estimating quantities of Excavated Soil.

9) Signed Delegation of Authority to sign waste manifests consistent.

2. Waste Management Work Plan

a. The Contractor shall demonstrate compliance with the requirements outlined in this Section, and Section 02 51 00 – Decontamination. The Contractor shall describe the sequencing, details, and means and methods for waste management including, but not limited to, the following information:

1) Debris

a) A list of equipment to be used to handle Debris.

b) A detailed description of proposed means and methods for processing, sorting, demolishing/cutting oversized Debris, and temporarily storing Debris to allow for inspection of Debris in accordance with the Cultural Resources Monitoring Plan.

c) A plan for the management of concrete encountered during excavation to include re-sizing and/or crushing in addition to any other requirements associated with non-concrete Debris.

d) A Tire Management Plan that describes any additional processing which may be required to manage recovered tires (e.g., quartering, shredding) prior to recycling or disposal.

e) A list of recycling facilities, landfills, and/or treatment facilities planned for disposal of Debris. This list shall include the name, location, phone number, and copy of the permit or license for each facility.

2) Other

a) A description of the process by which relevant waste media including WTS Waste and Other Waste generated from the Work shall be discarded.

3. A Transportation Plan that shall include copies of permits obtained for transportation and off-site disposal of WTS Waste and Other Waste generated from the Work. The Contractor shall provide a Transportation Plan to include the following:

a. A description of the means and methods for transporting Excavated Soil and PEM;

b. A description of the means and methods for transporting Debris to recycling, landfills, and/or treatment facilities planned for disposal of Debris; and

c. Copies of all relevant authorizations or permits for transportation of all material including, but not limited to, Excavated Soil, PEM, Debris, and Other Waste.

4. Quality Assurance Project Plan (QAPP)

a. The QAPP shall provide detailed methods for collecting and analyzing samples, including sampling techniques, details regarding sample transportation to the laboratory, maintenance of chain-of-custody, and quality assurance/quality control measures as required by EPA's "Uniform Federal Policy for Quality Assurance Project Plans" (EPA, 2005).

b. The QAPP will include samples collected during the Work performed and will cover all analytical samples of all media collected as part of this Work.

5. Progress Reports
    a. Detailed requirements for daily and weekly submittals shall be developed and adhered to.
6. Transport and Waste Profile Submittals, which must include the following.
    a. For In-barge S/S Mixing:
        1) Waste profile sampling results and waste profiles for PEM from In-barge S/S Mixing;
        2) Paint Filter Testing results if PEM is transported via truck; and
        3) Transportation manifests.
    b. For Off-site S/S Mixing:
        1) Paint Filter Test results if Excavated Soil is transported via truck;
        2) Transportation manifests;
        3) Certified weight tickets from the processing facility for untreated Excavated Soil or initially treated Excavated Soil delivered to the processing facility;
        4) Weight tickets for PEM transported from the processing facility to the end-placement facility or thermal treatment facility; and
        5) Waste profile sampling results and waste profiles for PEM processed at the off-site soil processing facility.
    c. Off-site Thermal Treatment:
        1) Weight tickets or equivalent records from the thermal treatment facility for S/S treated Excavated Soil delivered to the thermal treatment facility;
        2) Weight tickets or equivalent records for PEM transported from the thermal treatment facility to the end-placement facility;
        3) Waste profile sampling results and waste profiles for thermally treated soil; and
        4) Transportation manifests.
    d. End-Placement:
        1) Weight tickets for PEM as delivered to the end-placement facility;
        2) Certification or other means of evidence demonstrating beneficial use end-placement of PEM;
        3) Weight tickets for Debris as delivered to the disposal/recycling facility;
        4) Waste profiles for Debris as delivered to the disposal/recycling facility;
        5) Weight tickets for material from existing stockpiles as delivered to the end-placement facility;
        6) Waste profile sampling results and waste profiles for existing stockpiles; and
        7) Manifests, treatment, and disposal paperwork for all relevant media.

1.6 HEALTH AND SAFETY REQUIREMENTS

A. The Contractor shall comply with environmental health and safety/training requirements in accordance with the approved Health and Safety Plan.

PART 2: PRODUCTS

2.1 EQUIPMENT

A. The Contractor shall provide all equipment to perform the activities associated with Excavated Soil (including drilling spoils) and waste management including, but not limited to, the following.

1. Mixing Barges or Scows. Mixing barges or scows shall be sized to ensure that it can be maneuvered at the bulkhead. Mixing barges and scows must be equipped with markings for use with ullage tables.

2. Tugs. Tugs shall be appropriately sized to allow for safe maneuvering throughout the Canal.

3. Material Handler. A material handler will be required to offload material from the barge onto the lined pad at the Staging Site.

4. Equipment used for mixing and handling of Excavated Soil. Unloading cranes, buckets, hoppers, and other equipment shall be designed and equipped with spill plates, drip pans, and/or other mechanisms to prevent Excavated Soil or water from being spilled into the Canal.

5. Equipment used for handling Debris. Equipment used for handling Debris shall be kept clean to prevent soil from being spilled into the Canal.

6. Equipment used for handling Wash Water and decant water. The Contractor shall furnish pumps and piping to transfer decant water and Wash Water from barges and Wash Water from the Staging Site and any separate decontamination pad.

7. Equipment used for transporting Debris, treated soil/spoils, material, WTS Waste, and Other Wastes for off-site disposal. Barges, trucks, or railcars for transporting Debris, treated soil/spoils, WTS Waste, and Other Wastes shall be covered to prevent release of material during transport. Water-tight covers will be required for transport during precipitation. The Contractor shall be responsible for safeguarding transportation equipment from leakage of material in transport. Barges, trucks, or railcars shall be kept clean such that soil, drilling spoils, and Debris are not present outside of containment.

PART 3: EXECUTION

3.1 GENERAL

A. Mixed Excavated Soil and Drilling Spoils will be processed to meet acceptance criteria at beneficial use end-placement facilities, to the extent practical. The treatment approach used at the Fourth Street Turning Basin, which will also be implemented at the Site, is as follows:

1. Excavated Soil will undergo S/S treatment on-site via In-barge S/S Mixing or off-site at a commercial soil processing facility;

2. After S/S treatment, PEM will be tested to determine acceptability at the beneficial use end-placement facility; and

3. If PEM does not meet the acceptance criteria, PEM may require thermal treatment prior to end-placement.

B. This Section establishes execution requirements pertaining to:

1. In-barge S/S Mixing;

2. Off-site soil stabilization at a commercial soil processing facility;

3. Off-site thermal treatment as needed for Excavated Soil requiring further treatment after S/S to meet beneficial use end-placement acceptance criteria;

4. Placement of PEM at an end-placement facility approved by the Responsible Parties;

5. Handling and disposal of Debris;

6. Handling and disposal of WTS Waste; and

7. Handling and disposal of all Other Waste streams generated during the Work.

C. All of the Work shall be conducted in accordance with applicable regulatory requirements.

D. All waste streams generated during the Work will be disposed of in compliance with all applicable Federal, State, and local regulations.

3.2 GENERAL EXCAVATED SOIL TREATMENT AND END-PLACEMENT REQUIREMENTS

A. Excavated Soil shall be beneficially used following S/S and thermal treatment (if thermal treatment is required to meet acceptance criteria). The Contractor is responsible for identifying acceptable facilities to beneficially use the PEM. Acceptable beneficial use applications include, but are not limited, to the following:

1. Landfill cover for solid waste;

2. Strip mine reclamation; and

3. Fill material for industrial or commercial development.

B. Excavated Soil will undergo S/S (via In-barge S/S Mixing by the Contractor or at an off-site commercial processing facility) such that PEM meets the acceptance criteria for the approved beneficial use end-placement application. The Contractor is responsible for determining the appropriate percent of Portland cement required to stabilize the Site materials. Based on the similarity in composition between Site materials and those found at TB-4, it is anticipated that stabilization will require a minimum of 5% Portland cement. Dosage of Portland cement shall be no greater than 25% by wet weight. Should review of analytical testing of the PEM indicate that the material is not adequate to meet beneficial use end-placement acceptance criteria, PEM is to be thermally treated such that the treated soil meets beneficial use end-placement acceptance criteria.

C. The Contractor shall perform all testing and inspections required to evaluate compliance with end-placement acceptance criteria for beneficial use. Waste profiling is the responsibility of the Contractor.

D. The Contractor shall estimate quantities of Excavated Soil contained in barges after decanting of excess water through use of ullage tables.

3.3 IN-BARGE S/S MIXING OPERATIONS AND HANDLING OF PEM

A. The Contractor shall perform In-barge S/S Mixing in order to evaluate the: efficiency of mixing, effectiveness of S/S Reagents, physical properties with varying curing times, and odor and dust

release during mixing. The Contractor shall adhere to the following specifications regarding In-barge S/S Mixing:

1. In addition to complying with the community air monitoring plan (CAMP), In-barge S/S Mixing shall be performed in a manner that minimizes dust generated during mixing operations such that dust is not visible beyond the immediate vicinity of the mixing barge. In order to adequately control dust emissions, the Contractor shall use a spray bar or other system approved by the Engineer. Dust mitigation techniques will also be applied as needed while receiving the Reagent and stockpiling/storing Reagent.
2. The Contractor shall monitor air in the breathing zone during in-barge mixing in accordance with the Contractor's Health and Safety Plan (HASP).
3. S/S mixing shall continue until no pockets of unmixed Reagent are visible and the material appears visually homogenous.
4. The Contractor shall have readily available adequate spill containment and cleanup supplies in the event of a spill.
5. The Contractor must coordinate on-water movements with all local marine traffic during in-barge mixing operations.
6. The Contractor shall perform waste profile sampling of the PEM prior to transporting off-site.
7. PEM shall be managed exclusively on barges and shall not be placed elsewhere on the Staging Site.
8. Untreated material shall not be permitted to be stockpiled on the Staging Site.
9. The Contractor is responsible for coordination of the transportation of PEM to an approved off-site unloading facility, unloading the PEM and transport from the off-loading facility to a beneficial use end-placement facility or thermal treatment facility as appropriate.
10. The Contractor shall be responsible for any additional transportation, handling, and treatment of PEM due to rejection of PEM that has been transported to the end-placement facility or thermal treatment facility.

3.4 S/S OF EXCAVATED SOIL AT A COMMERCIAL SOIL PROCESSING FACILITY

A. The Contractor shall perform In-barge S/S Mixing in order to evaluate the: efficiency of mixing, effectiveness of S/S Reagents, physical properties with varying curing times, and odor and dust release during mixing. The Contractor shall adhere to the following specifications regarding In-barge S/S Mixing.

1. It is the responsibility of the Contractor to ensure that Excavated Soil meets any requirements for transport and acceptance to the commercial soil processing facility.
2. The commercial off-site soil processing facility must size and design operations and stockpile pad to ensure that processing operations are not impacted by lack of capacity.
3. Haulers shall not track material onto roadways as they leave the off-site facility.
4. The Contractor is responsible for coordinating the transportation of PEM from the commercial soil processing facility to a thermal treatment facility, if required, and/or to the end-use facility.

5. The Contractor is responsible for performing all required sampling of the PEM to determine if PEM meets beneficial use end-placement criteria or if thermal treatment is appropriate.

6. The Contractor shall be responsible for costs associated with additional transportation, handling, and treatment of PEM due to rejection of PEM that has been transported to the end-placement facility or thermal treatment facility.

7. In addition to complying with the CAMP, In-barge S/S Mixing shall be performed in a manner that minimizes dust generated during mixing operations such that dust is not visible beyond the immediate vicinity of the mixing barge. In order to adequately control dust emissions, the Contractor shall use a spray bar or other system approved by the Engineer. Dust mitigation techniques will also be applied as needed while receiving the Reagent and stockpiling/storing Reagent.

3.5 DEBRIS MANAGEMENT

A. Debris shall be managed as follows.

1. Debris will be separated using 6-inch grizzly bars (or other appropriate size) or similar screening equipment, and debris will initially be loaded into a material handling barge/scow moored in the Canal.

2. Washing of Debris to remove soils/sediments shall be performed on the barge/scow. Regardless, water to be used to wash debris shall be potable and Wash Water must be captured and treated through the WTS. The Contractor shall use best management practices to mitigate overspray and mist from washing activities.

3. The Contractor shall make reasonable efforts to divert Debris from landfills and to facilitate recycling of materials in accordance with guidelines in the New York City Department of Department of Design and Construction's Construction and Demolition Waste Manual (NYCDDC, 2003). The Contractor shall separate, store, protect, and handle identified recyclable Debris in a manner that maximizes recyclability of identified materials.

4. Washed Debris shall be placed on the lined pad to allow for inspection of the Debris in accordance with the Cultural Resources Monitoring Plan.

5. The Contractor shall preserve cultural resources in accordance with the Cultural Resources Monitoring Plan.

6. When practical, the Contractor shall clean and segregate recyclable Debris from non-recyclable Debris.

7. At the end of each work day and prior to the onset of rain or snow, or more frequently as directed by the Engineer, Debris piles shall be covered and secured using, at a minimum, 6-mil plastic sheeting free from holes or other damage to prevent precipitation from entering the Debris piles.

8. Covers shall be secured suitably to protect Debris piles from wind.

9. After Debris is segregated and cultural resources inspection is completed, Debris shall be transported to the recycling facility or landfill for disposal as non-hazardous waste.

3.6 LINED PAD AND WASH WATER MANAGEMENT

A. The Contractor shall manage activities on the lined pad such that unnecessary delays are not incurred due to spatial limitations on the pad.

B. For stockpiling of PEM or Debris and for washing of vehicles on the lined pad, the following specifications apply.

1. To prevent the release of soil from the lined pad, the Contractor shall wash (i.e. spray down) the lined pad with potable water or recycled water from the WTS as needed to minimize loading to the WTS, or as directed by the Engineer. Water pressure shall be adequate to effectively wash soil from the pad and shall be no less than 150 pounds per square inch . When the pad is washed free of visible soil and sheen, this process will be referred to as "decontaminating" the lined pad.

2. Wash Water will be allowed to accumulate on the lined pad to a depth less than that which would allow water to overtop the berming. Any water which overflows the lined pad shall be considered a spill and managed in accordance with the Contractor's Spill Prevention and Control Plan.

3. Wash Water shall not be left overnight to settle and must be pumped at a minimum at the end of each day when Wash Water is present on the pad.

4. The Contractor shall treat accumulated soil as Excavated Soil and it shall be treated either by in-barge mixing or sent for off-site commercial soil stabilization.

C. If the lined pad has been decontaminated or is not in use, the following specifications apply:

1. Stormwater accumulating on the decontamination pad may be directed to the existing stormwater facilities and/or directly to the basin.

D. The Contractor shall be responsible for maintaining the integrity of the lined pad.

1. The Contractor shall conduct weekly inspections of the lined pad accompanied by the Engineer. If cracks are detected, the Contractor shall be responsible for the required repairs.

3.7 MANAGEMENT OF WTS WASTE AND OTHER WASTES GENERATED FROM THE WORK

A. The Contractor shall treat all spent treatment media from the WTS as contaminated material and shall either recycle the media or discard properly in accordance with Federal, State, and local regulations.

B. Oil from the oil/water separator of the WTS shall be containerized and disposed properly in accordance with Federal, State, and local regulations.

C. Dense and/or Light Non-Aqueous Phase Liquid (DNAPL and/or LNAPL) from the NAPL/water separator of the WTS shall be containerized and disposed properly in accordance with Federal, State, and local regulations.

D. Used personal protection equipment (PPE) shall be discarded as refuse.

E. All water generated during the Work shall be treated in the WTS.

F. All other contaminated material generated during the Work shall be containerized and discarded properly in accordance with Federal, State, and local regulations.

3.8 MAINTAINING STAGING SITE CLEANLINESS

A. The Contractor shall keep the Staging Site clean while construction is in progress. The Contractor shall perform cleaning operations daily such that structures, grounds, and public property are free from accumulations of waste materials and rubbish.

B. The Contractor shall implement adequate spill protection measures on the Staging Site to prevent remediation-derived waste from polluting the Staging Site. The Contractor shall be

prepared with spill containment equipment in the event of a release of soil, decant, other waste water according to the Spill Prevention Section of the MMP.

C. The Contractor shall manage all wastes on the Staging Site and temporary facilities such that they do not create a hazardous condition and are not a hazard to on-site personnel.

D. The Contractor shall control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at regular intervals. Maintain good housekeeping practices for the Staging Site and temporary facilities throughout construction.

   1. Separate, store, protect, and handle identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvage ability of identified materials; and

   2. Provide and clearly identify and label the necessary containers, bins, and storage areas to facilitate effective waste management.

E. The Contractor shall comply with all regulations pertaining to management of waste.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 11 13

CAST-IN-PLACE CONCRETE FORMWORK

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Work specified in this Section consists of designing, furnishing materials for, fabricating, erecting, and removing formwork, falsework and shoring for cast-in-place concrete as indicated on the Construction Drawings, specified and needed for a complete installation.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete

B. Section 03 21 00 – Reinforcing Steel

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Concrete Institute (ACI) 117, Standard Tolerances for Concrete Construction and Materials.

2. ACI 303, Guide to Cast-in-Place Architectural Concrete Practice.

3. ACI 318, Building Code Requirements for Structural Concrete.

4. ACI 347, Guide to Formwork for Concrete.

5. ACI SP-4, Formwork for Concrete.

6. New York City Building Code.

7. American Plywood Association (APA): APA Grade - Trademark.

8. U.S. Department of Commerce Product Standards: PS-1-74 for Construction and Industrial Plywood.

9. Western Wood Products Association (WWPA): WWPA Catalog A.

1.4 SUBMITTALS

A. Working drawings, shop drawings and material specifications shall be submitted to the Engineer for review and approval in accordance with the Technical Specifications. Working drawings and shop drawings shall include, but not be limited to:

1. Design of all field-constructed and prefabricated formwork.

2. Detailed shop drawings shall be submitted which indicate, for each type of form required, material type, material thickness, finish, and a dimensional cross-sectional profile. Details of erection shall be shown on the shop drawings, including various connections, layouts of form units, placement directions, anchorage details, attachment of accessories, each condition requiring enclosures, cut opening, special jointing, and other accessories as required to complete the Work.

B. Manufacturer's specifications and installation instructions for each type of required formwork and accessory shall be submitted. These include each type of sheeting, chamfer strips, form facing

materials, form ties, form liners, rustication strips, form release agent, dovetail anchor slots, form coating material, form caulking, and similar items.

C. Plan of Reshoring.

1.5 QUALITY ASSURANCE AND QUALIFICATIONS

A. Formwork shall be designed and constructed in compliance with ACI SP-4 and ACI 303.

B. Design of Formwork

1. The Contractor shall assume responsibility for the design, engineering and construction of formwork. Forms shall be designed to produce concrete members identical in shape, lines and dimensions to members shown on the Construction Drawings.

2. The formwork shall be designed for the loads and lateral pressures in accordance with ACI 347 and wind loads as specified by the New York City Building Code.

3. Construction and control joints, openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features shall be provided as required.

4. Formwork shall be designed to be readily removable without impact, shock, or damage to 'green' concrete surfaces and adjacent materials.

5. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.

C. Unless otherwise specified in the Technical Specifications, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits as given in ACI 117.

D. Shop and working drawings reviews shall be obtained before custom fabrication is started and before delivery of materials to the Site.

E. The Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

F. Formwork erection procedures and health and safety of the work force shall be the responsibility of the Contractor. The requirements of authorities having jurisdiction shall be complied with.

G. Errors of detailing and fabrication and the correct fit of the formwork shall be the responsibility of the Contractor.

H. Materials, fabrications, and workmanship found defective shall be promptly removed and replaced and new acceptable Work shall be provided in accordance with the Technical Specifications at no additional expense to the Responsible Parties.

I. Design of formwork layout, spans, fastenings, joints, and framed openings shall be under the direct supervision of a Professional Engineer experienced in structural design of formwork and licensed in the State of New York.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the Site in an undamaged condition and at such intervals as will avoid delay in the Work.

B. Material shall be stored and protected in a clean, properly drained location. Material shall be kept off the ground under a weather-tight covering permitting good air circulation. Formwork materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have

slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure.

C. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and erecting. Panels shall be supported by using strong backs while lifting panels in a horizontal position.

1.7 FIELD MEASUREMENTS

A. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the Work shall be field verified. Variances and discrepancies from the Construction Drawings and potential interferences shall be reported promptly to the Engineer.

B. Sufficient field measurements shall be taken prior to preparation of shop drawings and fabrication of construction materials, where possible, to ensure proper fitting of the Work. However, job progress shall not be delayed. The Contractor shall allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the Work.

C. Actual field-verified conditions may require modifications to the fabrication and/or erection details as indicated on the Construction Drawings. The Work shall be performed to meet actual field conditions encountered.

1.8 JOB CONDITIONS

A. Formwork materials shall be protected before, during and after erection to insure acceptable finished concrete work. In-place materials and other operations of the Work in connection with concrete pours shall be protected.

B. In the event of damage to erected forms, necessary repairs or replacements prior to concrete pours shall be performed at no expense to the Responsible Parties.

C. The Contractor shall allow sufficient time, as determined by the Engineer from the approved schedule, between erection of forms and placing of concrete for the various trades to properly install their work.

D. External or superimposed loads, lateral or vertical, shall not be applied on casting concrete until concrete has developed the specified 28-day compressive strength.

E. Stay-in-place forms are not permitted unless otherwise shown on the Construction Drawings.

PART 2: PRODUCTS

2.1 GENERAL

A. Formwork surface materials shall be free of defects, warps, bends or any other damage so as not to produce an irregular, non-uniform concrete surface finish.

2.2 LUMBER

A. Only stress-grade lumber shall be provided. Form framing, sheathing and shoring shall conform to WWPA Catalog A.

B. For lumber in contact with concrete, the lumber shall be provided with dressed or tongue-and groove edges on at least the side contacting the concrete, unless otherwise indicated on the Construction Drawings.

2.3 PLYWOOD

A. Only grade-marked plywood conforming to APA shall be provided.

B. B-B Plyform, Exterior Class 1 or 2, or High Density Overlay (HDO) form plywood, Class 1 or 2 conforming to U.S. Product Standard PS-1 shall be provided.

C. Thickness shall be as required to maintain alignment and surface smoothness, but not less than 5/8 inch thick.

2.4 STEEL FORMS

A. Commercial grade sheets not less than 16 gauge shall be provided.

B. Steel forms in rust-free condition shall be maintained by use of steel wool and light grinding, followed by coats of the specified release agent.

C. Stock material that is free from warps, bends, kinks, cracks, and rust or other matter that could stain the concrete shall be provided.

D. Panels shall be fabricated in conformance with the approved submittals.

E. Outward facing surfaces shall be reinforced as required to prevent warpage and deformation during concrete placement.

2.5 FORM TIES

A. Commercially manufactured type form ties, hangers, and clamps of such type that, after removal of the forms, metal will not be closer than concrete cover as indicated on the Construction Drawings from concrete surface, shall be provided. Nonfabricated wire ties will not be permitted.

B. A cone-shaped, snap-in type form tie suitable for the intended use with a working load as required and an integral hot forged head shall be provided.

C. Ties with swaged washers or other suitable devices to prevent seepage of fluid along the ties shall be provided. Ties shall be left in place. She-bolt with water seals shall be provided.

D. Lugs, cones, washers, or other devices which do not leave holes or depressions greater than 1 inch in diameter shall be provided.

E. Products:

1. A-2 Cone Snap-in Form Tie; Dayton Superior, Miamisburg, OH or equivalent form tie as manufactured by Williams Form Engineering Corp., or Symons Corp.

2. Or approved equal.

2.6 CHAMFER STRIPS

A. 3/4 inch by 3/4 inch triangular fillets shall be provided, all of which shall be milled from clear, straight-grain pine, surfaced each side, or all of which shall be extruded vinyl type with or without nailing flange unless otherwise indicated on the Construction Drawings.

2.7 INSERTS

A. Galvanized cast steel or galvanized welded steel inserts, complete with anchors to concrete and fittings such as bolts, wedges and straps, shall be provided.

2.8 DOVETAIL ANCHOR SLOTS

A. Dovetail anchor slots manufactured from 22 gauge, electro-galvanized steel with removable felt or polyurethane filler, where indicated on the Construction Drawings shall be provided.

2.9 SHOP FABRICATED FORMS

A. Forms shall be fabricated in accordance with the approved submittals.

B. Forms shall be maintained clean, smooth, and free from imperfections and warpage.

C. Locate joints as indicated on the approved shop drawings.

1. Form panels shall be arranged in symmetrical patterns conforming to the general lines of the structure.

2. Except when otherwise indicated on the Construction Drawings, panels on vertical surface shall be oriented with the long dimension horizontal joints level and continuous.

3. Form panels on each side of the panel joint shall be precisely aligned by means of fasteners common to both panels, to result in a continuous, unbroken concrete surface.

4. Largest stock size practicable shall be provided.

5. Between form joints, areas less than the stock size of the form liner material shall be lined with a single piece of liner material.

2.10 FORM CAULKING

A. Form caulking shall be a one-component, gun-grade silicone sealant that is capable of producing flush, watertight and non-absorbent surfaces and joints. Sealant shall be compatible with the type of forming material and concrete ingredients used.

B. Products:

1. Series 1200 Construction Caulking; GE Silicones, Waterford, NY.

2. Dow Corning 999-A; Dow Corning Co., Midland, MI.

3. Or approved equal.

2.11 FORM RELEASE AGENT

A. Form release agent shall be a volatile organic compounds (VOC) compliant commercial formulation form-coating compound that will not bind with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds. Form release agent shall be a nonreactive type as approved by American National Standards Institute/Alert Standard Format specification (ANSI/ASF).

1. Products:

a. Specco F-100; Specco Industries, Inc., Chicago, IL.

b. Debond Form Coating; L&M Construction Chemicals, Inc., Omaha, NE.

c. Magic Kote; Symons Corporation, Des Plaines, IL.

d. Or approved equal.

B. Form film shall conform to the requirements of Paragraph 2.11.A.

1. Thinner shall be provided as recommended by manufacturer of the form film.

2. Products:

a. Form film; Symons Corporation, Des Plaines, IL.

b. Or approved equal.

2.12 FORM LINERS

A. Not Used.

B. Products:

1. Dura-Tex; Symons Corporation, Des Plaines, IL.

2. Or approved equal.

2.13 RUSTICATIONS

A. Not Used.

B. Products:

1. Rustications; Symons Corporation, Des Plaines, IL.

2. Or approved equal.

PART 3: EXECUTION

3.1 PREPARATION

A. The areas and conditions under which the Work of this Section is to be performed shall be examined. Conditions detrimental to the proper and timely completion of the Work shall be corrected. The Work shall not proceed until unsatisfactory conditions have been corrected. Prior to placement of concrete, forms shall be inspected for cleanliness and accuracy of alignment.

B. Earth cuts shall not be used as forms for vertical surfaces, unless shown on the Construction Drawings or specified in the Technical Specification.

3.2 ERECTION AND INSTALLATION

A. Forms shall be constructed in accordance with ACI 347 to required dimensions, plumb, straight and mortar tight, and all joints and seams shall be made mortar-tight. Forms shall be substantial, properly braced, and tied together to maintain position and shape and to resist all pressures to which they may be subject. Unless otherwise indicated on the Construction Drawings or Technical Specifications, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits in ACI 117.

B. The size and spacing of studs and wales shall be determined by the nature of the Work and the height to which concrete is placed. Forms shall be made adequate to produce true, smooth surfaces.

C. Forms shall be supplied for repeated use in sufficient number to ensure the required rate of progress. Forms shall be cleaned and inspected immediately prior to depositing concrete. Deformed, broken or defective forms shall be removed from the Work.

D. Joints shall be snug and tight and shall occur only at the designated locations. Construction and control joints other than those shown on the Construction Drawings shall be approved by the Engineer. Horizontal joints shall be level, and vertical joints shall be plumb. Joints shall be made perpendicular to the main reinforcement except where otherwise indicated on the Construction Drawings.

E. Temporary openings shall be provided where interior area of formwork is inaccessible for cleanout or inspection before concrete placement, and for placement of concrete. Temporary openings shall be securely braced and set tightly to forms to prevent the loss of concrete mortar. Temporary openings shall be located on forms in locations as inconspicuous as possible consistent with the requirements of the Work.

F. Openings shall be provided in concrete formwork of the correct size and in the proper location to accommodate other operations of construction work in the project. Expansion joint material and other embedded items to be built into forms shall be accurately placed and securely supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

G. Edge forms or bulkheads and intermediate screed strips for slabs shall be set to obtain required elevations and contours in the finished slab surface.

H. Forms shall be set sufficiently to prevent joints in wood forms from opening prior to concrete pour.

I. Cutting form ties back from the face of the concrete shall not be permitted.

J. Formwork shall be observed continuously while concrete is being placed to see there are no deviations from desired elevation, alignment, plumbness and camber. If, during casting, weakness develops and the formwork shows settlement, deflection or distortion, the Work shall be stopped, improperly cast concrete shall be removed and the formwork shall be reconstructed to perform properly.

    1. Forms shall be erected in accordance with ACI 117, with a maximum camber of 3/4 inch in 20 feet. Exposed external corners, except where specially shown on the Construction Drawings shall be provided with 3/4-inch bevel strips securely nailed on all concrete formwork.

K. Form release agents shall be applied in accordance with manufacturer's instructions and as specified herein:

    1. Form contact surfaces shall be coated with form release agent compound before reinforcement is placed. Excess form release agent material shall not be allowed to accumulate in the forms or to come into contact with surfaces which are required to be bonded to fresh concrete such as concrete reinforcement and embedded items.

    2. Steel forms shall be coated with non-staining, rust-preventive form oil or otherwise shall be protected against rusting. Rust-stained steel surfaces in contact with concrete shall not be used.

L. Excess form coating material shall not be allowed to accumulate in the forms.

M. Form coatings shall not be allowed to come in contact with construction joints or reinforcing steel.

N. Runways for moving equipment shall be provided with struts or legs and supported directly on the formwork or structural member without resting on the reinforcing steel.

O. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

P. All sleeves, inserts, anchors, and embedded items required for adjoining work or for support of joining work shall be placed prior to concreting.

Q. Architectural Formwork

1. Form liners and rustication strips shall be installed in strict accordance with the manufacturer's written instructions and recommendations. The ends of the form liner pattern shall be clogged and all form joints and edges shall be taped using 1/8-inch thick by 3/4-inch wide foam tape centered on the joints, then caulked in accordance with the manufacturer's recommendations each time forms are set. A representative of the manufacturer shall be present at the Site to supervise the installation of the form liner for the entire project.

2. Forms for smooth concrete shall be installed in such a manner that there will be no horizontal form joints, and the forms shall be aligned so that vertical joints occur only at "V-Groove" rustications. Form ties shall be spaced in a uniform pattern vertically and horizontally. Form ties shall be positioned in smooth concrete bands and in panels between "reveal" rustications, if any.

3. Beam and girder soffits shall be erected in accordance with ACI 117 and sufficiently braced, shored, and wedged to prevent deflection. Column sides shall be clamped in accordance with this Technical Specification with metal column clamps, spaced according to the manufacturer's directions.

3.3 PROTECTION

A. During installation, the forms shall not be used as a storage platform nor as a working platform until the forms have been permanently fastened in position.

B. The surface of installed forms shall not be overloaded.

3.4 RESHORING (NOT USED)

3.5 REMOVAL OF FORMS AND TIES

A. Forms shall be removed in accordance with ACI 347 recommendations without damage to concrete and in a manner to insure complete safety to the structure. Forms, form ties and bracing shall not be removed without specific permission of the Contractor's registered Professional Engineer.

B. Top forms on sloping surfaces of concrete shall be removed as soon as removal operations will not allow the concrete to sag. Any needed repairs or treatment required on sloping surfaces shall be performed at once and shall be followed immediately with the specified curing.

C. Upon removal of forms, the Engineer shall be notified in order that a review of the newly stripped surfaces may be made before patching.

D. Wood forms for wall openings shall be loosened without causing damage to the concrete. The face of concrete shall not be pried against. Only wooden wedges shall be used.

E. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured in accordance with one of the methods specified in Section 03 30 00 – Cast-in-Place Concrete.

F. In general, forms shall not be removed until the concrete has hardened sufficiently to safely support its own load, plus any superimposed load that might be placed thereon. As a minimum the forms shall be left in place for at least 2 days until the concrete has attained a compressive strength of 1,500 pounds per square inch (psi). The time represents cumulative days, not necessarily consecutive, during which the air surrounding the concrete is above 50°F. The time shall be increased if the concrete temperature following placement is permitted to drop below 50°F.

G. Care shall be taken in removing forms, wales, shrings, supports and form ties to avoid spalling or marring the concrete. Rubbed finish, if required, and such patching as may be necessary shall be started immediately after removal.

3.6 RE-USE OF FORMS

A. Forms for re-use shall meet requirements for new forms with respect to effect on cast-in-place concrete appearance and structural stability.

B. Re-use of forms shall in no way delay or change the concrete placement schedule as compared to the schedule obtainable if all forms were new (in the case of wood forms) of if the total required forms were available (in the case of metal forms).

C. Formwork shall be cleaned and re-oiled prior to re-use. Plywood forms shall not be re-used if unused holes from form ties exist from a previous use. High density overlay plywood panels shall be thoroughly cleaned and lightly recoated before each additional use. Wood forms shall not be used more than three times.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 21 00

REINFORCING STEEL

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall furnish and install all reinforcing steel as indicated on the Construction Drawings including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this Section.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-In-Place Concrete

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Society for Testing and Materials (ASTM) A82, Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184, Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. ASTM A1064, Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
4. ASTM A496, Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A497, Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
6. ASTM A615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A616, Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM A617, Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.
9. ASTM A706, Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
10. ASTM A767, Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
11. ASTM A775, Epoxy-Coated Reinforcing Steel Bars.
12. ASTM A1064, Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
13. American Concrete Institute (ACI) 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
14. ACI 318, Building Code Requirements for Reinforced Concrete.
15. ACI SP66, Detailing Manual.
16. American National Standards Institute/American Welding Society (ANSI/AWS) D1.4, Structural Welding Code – Reinforcing Steel.
17. Concrete Reinforcing Steel Institute (CRSI) DA4, Concrete Reinforcing Steel Institute Manual of Standard Practice.
18. New York City Building Code.

1.4 REQUIREMENTS FOR REINFORCING STEEL

A. Placing drawings showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories without reference to the project drawings shall be submitted to the Engineer for approval before fabrication.

B. Details of concrete reinforcement not covered on the Construction Drawings or herein shall be in accordance with ACI 315, ACI 318 and CRSI DA4.

C. When it is found necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement, conduits, or embedded items, a submittal showing the resulting arrangement of reinforcement shall be submitted to the Engineer for approval.

D. All reinforcement, at the time concrete is placed, shall be free of mud, oil or other materials that may adversely affect or reduce the bond. Reinforcement with rust, mill scale or a combination of both shall be considered satisfactory provided the minimum dimensions, weight and height of deformation of a hand-wire-brushed test specimen are not less than the applicable ASTM requirement.

E. All reinforcement shall be supported and fastened before concrete is placed and shall be secured against displacement within the tolerances permitted in Part 3.1.D of this Section.

F. Templates shall be furnished for placement of all dowels/embedments unless otherwise permitted by the Technical Specifications.

G. All splices shall be as indicated on the Construction Documents unless otherwise permitted by the Engineer. Mechanical connections that provide a minimum of 125% of the yield strength of the reinforcing bars may be used when permitted by the Engineer.

1. Reinforcement coating shall be removed in the area of the mechanical connection, if so required by the connection manufacturer.
2. After installation of mechanical connections on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All external parts of mechanical connections used on coated bars, including steel splice sleeves, bolts and nuts, shall be coated with the same material used for repair of coating damage.

1.5 TESTING (NOT USED)

1.6 SUBMITTALS

A. The Contractor shall submit placing drawings, shop drawings and material specifications to the Engineer for approval. Submittals shall include, but not be limited to:

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI SP66, shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars;
2. Certified copies of mill reports shall accompany all deliveries of reinforcing steel;
3. Description of the reinforcing steel manufacturer's marking pattern;
4. Description of proposed supports for each type of reinforcing; and
5. Description of reinforcing weld locations and weld procedures.

B. The Contractor shall also include:

1. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated;

2. Request to use splices not shown on the Construction Drawings;

3. Requests to use mechanical couplers, along with manufacturer's literature on mechanical couplers, with instructions for installation, and certified test reports on the couplers' capacity; and

4. Requests and procedures to field bend or straighten partially embedded reinforcing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the Site. Bundles shall be properly identified for coordination with mill test reports.

B. Coating damage on zinc-coated (galvanized) reinforcing bars due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

C. Equipment for handling epoxy-coated reinforcing bars shall have protected contact areas. Bundles of coated bars shall be lifted at multiple pickup points to prevent bar-to-bar abrasion from sags in the bundles. Coated bars or bundles of coated bars shall not be dropped or dragged. Coated bars shall be stored on protective cribbing. Coating damage due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

D. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

E. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

F. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be re-inspected and if necessary re-cleaned.

PART 2: PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel

1. All reinforcing steel shall be deformed except spirals and welded wire fabric, which may be plain bars. Reinforcement shall be the grades required by the Construction Drawings and shall conform to one of the following specifications.

a. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

b. ASTM A706 – Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

c. Reinforcing steel shall conform to the applicable requirements of Section 03 30 00 – Cast-in-Place Concrete and the New York City Building Code.

B. Coated Reinforcing Bars

1. When required by the Construction Drawings, reinforcing bars shall be zinc-coated (galvanized) or epoxy-coated. The reinforcing bars to be coated shall conform to the requirements of this Section.

    a. Zinc-Coated (Galvanized) Reinforcing Bars: Zinc-coated (galvanized) reinforcing bars shall conform to ASTM A767. Supplementary requirements S1 and S2 shall apply when fabrication after galvanization includes cutting and bending. Supplementary requirement S2 shall apply when fabrication after galvanization includes only bending. Repair of damaged zinc coating when required shall be made with a zinc-rich formulation conforming to ASTM A767. Repair shall be done in accordance with the material manufacturer's recommendations.

    b. Epoxy-Coated Reinforcing Bars: Epoxy-coated reinforcing bars shall conform to ASTM A775. Coating damaged due to shipping, handling and placing need not be repaired in cases where the damaged area is 0.1 square inches or smaller. Repair damaged areas larger than 0.1 square inches with patching material conforming to ASTM A775 and in accordance with the material manufacturer's recommendations. The maximum amount of damage including repaired and unrepaired areas shall not exceed 2% of the surface area of each bar. Fading of the coating color will not be cause for rejection of epoxy-coated reinforcement.

C. Bar Mats

1. Bar mats shall be of the clipped type conforming to ASTM A184 and shall be fabricated from reinforcing bars that conform to the requirements of this Section.

    a. When specified by the Construction Drawings, bar mats shall be fabricated from zinc-coated (galvanized) reinforcing bars. Metal clips shall be zinc-coated (galvanized). Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

    b. When specified by the Construction Drawings, bar mats shall be fabricated from epoxy-coated reinforcing bars. Metal clips shall be epoxy-coated. Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

D. Wire

1. Wire, when specified or required, shall be smooth or deformed wire as indicated.

    a. Smooth wire shall conform to ASTM A82.

    b. Deformed wire shall conform to ASTM A496, size D4 and larger.

E. Welded Wire Fabric

1. Welded wire fabric, when specified or required, shall be fabricated from smooth or deformed wire and shall conform to the wire size and wire spacing required or indicated on the Construction Drawings. Welded wire fabric shall conform to one of the following specifications.

    a. Plain wire fabric ASTM 1064, except welded intersections, shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

b. Deformed wire fabric ASTM A497, except welded intersections, shall be spaced not farther apart than 16 inches in the direction of the principal reinforcement.

F. Spirals

1. When specified on the Construction Drawings, spirals shall be fabricated from reinforcing bars or wire.

2.2 WIRE BAR SUPPORTS

A. Unless permitted otherwise by the Technical Specifications, wire bar supports shall be in accordance with Class 1, maximum protection or Class 2, moderate protection in Chapter 3 of CRSI DA4.

2.3 COATED WIRE REINFORCEMENT SUPPORTS

A. For Epoxy-Coated Reinforcement:

1. Use wire reinforcement supports coated with dielectric material including epoxy or other polymer for a minimum distance of 2 inches from the point of contact with epoxy-coated reinforcement.

B. For Zinc-Coated Reinforcement:

1. Use galvanized wire reinforcements supports or wire reinforcement supports coated with dielectric material with zinc-coated reinforcement.

2.4 PRECAST CONCRETE REINFORCEMENT SUPPORTS

A. Concrete supports used for supporting reinforcement shall be not less than 4 inches square having a compressive strength equal to or greater than the specified compressive strength of the concrete being placed.

2.5 WELDING

A. When required or permitted, all welding of reinforcing bars shall conform to ANSI/AWS D1.4. Unless otherwise permitted by the Engineer, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

B. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and any supplementary requirements specified by the Engineer for Concrete Construction for the particular application.

C. After completion of welding on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All welds and all steel splice members used to splice bars shall be coated with the same material used for repair of coating damage.

2.6 DOWEL ADHESIVE SYSTEM

A. Where shown on the Construction Drawings or required, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

B. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125% of the yield strength of the bar, unless noted otherwise on the Construction Drawings.

C. The adhesive system shall be:

1. HIT HY-150 Injection Adhesive Anchor System as manufactured by Hilti, Inc., Plano, TX.
2. Epcon System as manufactured by ITW Ramset/Redhead, Glendale Heights, IL.
3. Sikadur Injection Gel as manufactured by Sika Corp., Lyndhurst, NY.
4. Or approved equal.

D. The approval of the Engineer is required for use of this system in locations other than those shown on the Construction Drawings.

2.7 TEMPERATURE REINFORCING

A. Unless otherwise shown on the Construction Drawings or in the absence of the concrete temperature reinforcing being shown:

1. The minimum cross sectional area of horizontal and vertical concrete temperature reinforcing in walls shall be 0.0033 times the gross concrete area.
2. The minimum cross sectional area of temperature reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area.

B. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

PART 3: EXECUTION

3.1 FABRICATION

A. All reinforcement shall be bent cold unless otherwise permitted by the Engineer.

B. Fabricating and Placing Tolerances

C. Reinforcing bars shall be fabricated in accordance with the standard fabricating tolerances in Figures 4 and 5 of ACI 315. Tolerances shall not permit a reduction in cover.

D. When it is necessary to move bars to avoid interference with other reinforcement, conduits, or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to approval of the Engineer.

3.2 PLACING

A. Minimum concrete cover for reinforcement, except for extremely corrosive atmosphere, other severe exposures or fire protection, shall be as follows unless indicated otherwise on the Construction Drawings.

B. For bundled bars, minimum concrete cover shall be equal to the equivalent diameter of the bundles but need not be greater than 2 inches; except for concrete deposited against and permanently in contact with the ground, minimum cover shall be 3 inches. The equivalent diameter of the bundle shall be based on a single bar of a diameter derived from the equivalent total area.

C. Unless otherwise indicated on the Construction Drawings, Reinforcement supported from the ground or mud mat shall rest on precast concrete blocks not less than 4 inches square and having a compressive strength equal to or greater than the specific compressive strength of the concrete being placed. Other means of support may be used if accepted by the Engineer.

D. Reinforcement supported from formwork shall rest on bar supports made of concrete, metal, plastic or other acceptable materials. Where the concrete surface will be exposed to the weather

in the finished structure, the portions of all bar supports within 1/2 inch of the concrete surface shall be non-corrosive or protected against corrosion.

E. Zinc-coated (galvanized) reinforcing bars supported from formwork shall rest on galvanized wire bar supports coated with dielectric material or on bar supports made of dielectric material or other acceptable materials. All other reinforcement and embedded steel items in contact with galvanized reinforcing bars or within a minimum clear distance of 2 inches from galvanized reinforcing bars, unless otherwise required or permitted, shall be galvanized.

F. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy coated. In walls having epoxy-coated reinforcing bars, spreader bars, where specified, shall be epoxy coated. Proprietary combination bar clips and spreaders used in wall with epoxy-coated reinforcing bars shall be made of corrosion-resistant material or coated with dielectric material.

G. Zinc-coated (galvanized) reinforcing bars shall be fastened with zinc-coated tie wire or non-metallic-coated tie wire or other acceptable materials.

H. Epoxy-coated reinforcing bars shall be fastened with nylon-epoxy, plastic-coated tie wire, or other acceptable materials.

I. Welded wire fabric for slabs on grade shall extend to within 2 inches of the concrete edge. Welded wire fabric may extend through the contraction joints. Welded wire fabric shall be adequately supported during placing of concrete to assure proper positioning in the slab.

J. Bending or straightening of bars partially embedded in concrete shall not be permitted except when specifically approved by the Engineer. Bending and preheating shall be in accordance with the requirements of this Section.

3.3 BENDING OF BARS

A. The minimum inside bend diameters shall conform to the following requirements unless otherwise permitted by the Engineer.

Bar Size	Minimum Diameter
No. 3 through 8	6 bar diameters
No. 9, 10, 11	8 bar diameters
No. 14 and 18	10 bar diameters

B. The beginning of the bend shall not be closer to the concrete surface than the minimum diameter of the bend. Preheating, if required, shall be in accordance with the requirements of Part 3.4 of this Section. The following requirements shall be adhered to for individual bar sizes:

Bar Size	Bend Requirements
No. 3 through No. 5	Bars may be cold bent the first time. Cold bend bars only when temperature is above 32º F. Preheating is required for subsequent straightening or bending.
No. 6 and larger	Preheating is required.

C. When zinc-coated (galvanized) or epoxy-coated reinforcing bars are field bent, coating damage shall be repaired in accordance with the requirements of Part 2.1.B of this Section.

3.4 PREHEATING OF BARS

A. Preheating prior to bending or straightening, when required, shall be in accordance with the following requirements.

1. The preheat shall be applied to a length of bar equal to at least 5 bar diameters each way from the center of the bend except that preheat shall not extend below the surface of the concrete. The temperature of the bar at the concrete interface shall not exceed 500º F.

2. The preheat temperature shall be 1,100 to 1,200º F.

3. The preheat temperature shall be maintained until bending or straightening is complete.

4. The preheat temperature shall be measured by temperature measurement crayons, contact pyrometer or another acceptable method.

5. Heated bars shall not be artificially cooled until the material temperature is less than 600º F.

B. Preheating may be applied by any method which does not harm the bar material or cause damage to the concrete.

3.5 SPLICING

A. Reinforcing bar splices shall only be used at locations shown on the Construction Drawings. When it is necessary to splice reinforcing at points other than where shown, the character of the splice shall be approved by the Engineer.

B. The length of lap for reinforcing bars, unless otherwise shown on the Construction Drawings shall be in accordance with ACI 318 for a Class B splice.

C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

D. Mechanical and welded splices shall be used only where shown on the Construction Drawings or when approved by the Engineer.

E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Construction Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.6 DOWEL ADHESIVE SYSTEM INSTALLATION

A. The installation of the dowels shall be done in strict conformance with the manufacturer's recommendations. The dowels shall be supported in the correct position until the adhesive sets and gains enough strength to prevent any dislocation.

B. Not Used.

C. If the dowels are required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.

3.7 MISCELLANEOUS INSTALLATION REQUIREMENTS

A. Exposed Reinforcement

1. Reinforcement left exposed for the bonding of future construction shall be effectively protected from corrosion by encasement in cement mortar or by other temporary covering as approved by the Engineer.

B. Field Cutting of Reinforcement

1. Reinforcement shall not be cut in the field except when specifically permitted by the Engineer in writing.

C. Reinforcement Through Expansion Joint

1. Reinforcement or other embedded metal items bonded to the concrete shall not be continuous through any joint intended as an expansion joint. Dowels bonded on only one side of a joint may extend through the joint.

3.8 INSPECTION

A. No concrete shall be deposited until the Special Inspector for Concrete Construction or his approved representative has inspected the placing of the reinforcing steel and has given permission to place the concrete. Concrete placed in violation of this provision may be rejected with subsequent removal by the Contractor.

B. The Contractor shall advise the Engineer of intentions to place concrete and shall allow adequate time for inspection of all reinforcing steel before concrete is placed.

C. The Contractor shall advise the Engineer of intentions to place grout in masonry walls and shall allow adequate time for inspection of all reinforcing steel before grout is placed.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Work covered under this Section includes the furnishing of all materials, labor, tools, equipment and incidentals necessary to complete construction, installation and inspection of concrete items as shown on the Construction Drawings and specified herein. The Work includes but is not limited to the following:

a. Furnishing, fabrication and construction of forms and steel reinforcement; and

b. Furnishing, transporting and placing concrete for concrete bulkhead cap.

1.2 RELATED SECTIONS

A. Section 03 11 13 – Cast-in-Place Concrete Formwork

B. Section 03 21 00 – Reinforcing Steel

1.3 REFERENCES

A. The following references and standards are used in this Section.

1. American Concrete Institute (ACI)

a. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

b. ACI 305, Recommended Practice for Hot Weather Concreting.

c. ACI 306, Recommended Practice for Cold Weather Concreting.

d. ACI 309, Standard Practice for Consolidation of Concrete.

e. ACI 311, Recommended Practice for Concrete Inspection.

f. ACI 315, Manual of Standard Practice for Reinforced Concrete.

g. ACI 318, Building Code Requirements for Reinforced Concrete.

h. ACI 347, Recommended Practice for Concrete Formwork.

2. American Society for Testing and Materials (ASTM)

a. ASTM C33, Specifications for Concrete Aggregates.

b. ASTM C94, Specifications for Ready-Mixed Concrete.

c. ASTM C136, Methods for Sieve Analysis of Fine and Coarse Aggregates.

d. ASTM C150, Specifications for Portland Cement.

e. ASTM C171, Specification for Sheet Materials for Curing Concrete.

f. ASTM C260, Specification for Air-Entraining Admixtures for Concrete.

g. ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

h. ASTM C494, Specification for Chemical Admixtures for Concrete.

i. ASTM C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

j. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

3. American Association of State Highway and Transportation (AASHTO)

a. AASHTO M182, Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.

1.4 SUBMITTALS

A. The Contractor shall submit the following:

1. Shop drawings showing dimensions for concrete details, location of construction joints, and layout of reinforcing, including dimensions, splicing details, inserts, and proposed sequence of pours;

2. Certified test reports for all aggregate and admixtures used in the mix design;

3. Concrete mix design with supporting mix proportioning data prepared by an approved testing laboratory; and

4. Recent sieve analysis of fine and coarse aggregate and ASTM C136 test data, as made by the approved laboratory. Materials tested shall be from the same source and of the same physical characteristics as those used on the job.

1.5 QUALITY ASSURANCE

A. General

1. The Work performed under this Technical Specification shall comply with the applicable provisions and recommendations of the publications listed in Part 1.4 of this Section, above.

2. The Contractor shall employ, at its own expense, a testing laboratory experienced in the design and testing of concrete materials and mixes. This laboratory shall be responsible for all concrete mix design and trial batch testing.

3. Testing agencies that perform testing services on concrete shall meet the requirements of ASTM E329 and be licensed by the New York City Department of Buildings.

4. Testing and inspection shall be conducted in accordance with the requirements of ASTM C1077 and other applicable standards.

5. Prior to performing any of the Work, the qualifications of the proposed testing agency shall be submitted to the Engineer for review and approval.

6. Tests of concrete required by this Technical Specification shall be made by an ACI Concrete Field Testing Technician Grade 1 or equivalent. Equivalent certification programs shall include requirements for written and performance examinations as stipulated in ACI publication CP1.

7. Prior to approval, all testing of proposed materials and mix designs including trial batch testing shall be at the Contractor's expense.

B. Laboratory Trial Batches

1. Each concrete mix specified shall be verified by a laboratory trial batch, unless indicated otherwise.
2. Each trial batch shall include the following testing:
    a. Aggregate gradation for fine and coarse aggregates;
    b. Combined aggregate gradation including total percentage of each aggregate size retained on each sieve;
    c. Fly ash testing to verify meeting specified properties, unless certification by an independent testing laboratory is provided by the fly ash supplier;
    d. Slump;
    e. Air content; and
    f. Compressive strength based on 3 cylinders tested at 7 days and 3 cylinders tested at 28 days (6 cylinders total).
3. Each trial batch shall provide the following information:
    a. Project identification name and number;
    b. Date of report;
    c. Complete identification of aggregate source of supply;
    d. Tests of aggregates for compliance with specified requirements;
    e. Scale weight of each aggregate;
    f. Absorbed water in each aggregate;
    g. Brand, type and composition of cement;
    h. Brand, type and amount of each admixture;
    i. Amounts of water used in trial mixes;
    j. Proportions of each material per cubic yard;
    k. Gross weight and yield per cubic yard of trial mixtures;
    l. Measured slump;
    m. Measured air content; and
    n. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7-day and 28-day test, and for each design mix.
4. The requirement for a trial batch may be waived if the required test information has been provided in a previous laboratory trial batch run on the identical mix design within the previous two years. The same brand, type, and source of all materials must have been used.

PART 2: PRODUCTS

2.1 MATERIALS

A. Cement: Cement for all concrete shall be Portland Cement Type I or II complying with the requirements of ASTM C150.

B. Fine Aggregate: Fine aggregate for concrete shall comply with the requirements of ASTM C33 and ACI 318. It shall consist of clean, hard, strong, durable uncoated particles of mineral origin, free from salt, loam, shale, clay and other deleterious matter and shall be well graded from coarse to fine.

C. Coarse Aggregate: Coarse aggregate for concrete shall be well graded and comply with the requirements of ASTM C33 and ACI 318. It shall consist of nominal maximum ¾-inch crushed sound stone, composed of hard, strong, durable uncoated pieces free from soft, thin elongated or laminated fragments.

D. Water: Water used in concrete shall be clear and free from oil, acids, salts, organic material or other substances that may be deleterious to concrete or steel. Water shall meet the requirements of ASTM C94.

E. Reinforcing Steel: Reinforcing steel shall be as specified in Section 03 21 00 – Reinforcing Steel.

F. Admixtures

1. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instructions. All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by Engineer.

2. Air entraining admixtures shall conform to the New York State Department of Transportation (NYS DOT) approved list #8 and ASTM C260.

3. Normal range or midrange water reducing admixture shall be in conformance with ASTM C494, and comply with NYS DOT approved list #13.

4. High-Range Water Reducing Admixture

   a. High range water reducer shall conform to ASTM C494, Type F or G and comply with NYS DOT approved list #13.

   b. The high range water reducing admixture shall be accurately measured and added at the batch plant facility. The Contractor may redose the concrete no more than 2 times with the high range water reducer at the Site, provided that a calibrated dispenser system and containers of high range water reducer sealed and labeled by the manufacturer are used.

5. Set Controlling Admixture

   a. Set controlling admixture shall be either with or without water-reducing properties.

   b. Where the air temperature at the time of placement is expected to be consistently over 90º F, a water-reducing set controlled admixture conforming to ASTM C494, Type D and NYS DOT approved list #11 shall be used.

c. Where the air temperature at the time of placement is expected to be consistently under 40º F, except for mass concrete placement, a non-corrosive, non-chloride accelerator conforming to ASTM C494, Type C and NYS DOT approved list #14 shall be used.

6. Shrinkage Reducing Admixture: A shrinkage reducing admixture is permitted to be used in the mix design where necessary to meet specified shrinkage limitations provided that specified strength requirements are met and there is no reduction in sulfate resistance and no increase in permeability.

7. Calcium chloride, admixtures containing thiocyanate, or admixtures containing more than 0.05% chloride ions shall not be used.

2.2 CONCRETE MIX DESIGN

A. All structural concrete shall be composed of materials meeting the requirements of this Technical Specification proportioned so as to provide the minimum compressive strength of 4,000 pounds per square inch (psi) at 28 days.

B. All structural concrete shall be designed to a minimum water-cement ratio to limit shrinkage and produce maximum durability. Maximum water-cement ratio shall be 0.40.

C. Maximum slump shall be 5”±1”.

D. Air content shall be 6% ±1.5%.

E. The Contractor shall employ and pay for an approved Testing Laboratory to design a series of concrete mixes using the materials and sources which he proposes to employ during the Work. Concrete design mixes shall produce an average strength 15% higher than the minimum 28-day strength specified. Design mixes shall comply with ACI 318.

2.3 CURING AND PROTECTION MATERIALS

A. Absorptive covers shall consist of burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M182, Class 3.

B. Curing mats shall be heavy carpets or cotton mats, quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

C. Moisture retaining covers shall conform to ASTM C171 and consist of one of the following materials:

1. Waterproof paper;

2. Polyethylene film; or

3. White burlap-polyethylene sheet.

D. Curing compounds shall conform to the requirements of ASTM C309 Type 1-D (water retention requirements). Provide one of the following.

1. Super Aqua Cure VOX, as manufactured by The Euclid Chemical Company.

2. Or equal.

E. Insulation Blankets

1. Closed cell flexible foam sheet material such as polystyrene or urethane shall be used. Foam sheet material which is capable of being bent 90º F without breaking or tearing shall be provided at corners. The foam insulation blankets shall be 1/2-inch thick.

2. Quilted, flexible insulation blankets that retain their insulating value when wet and which retard the evaporation of water shall be used.

PART 3: EXECUTION

3.1 PREPARATION

A. Prior to pouring concrete, the Contractor shall ensure that all formwork and reinforcing are clean, dry and free from deleterious materials.

B. The Contractor shall not pour concrete in the absence of the Engineer/Concrete Inspection Agency.

3.2 CONCRETE HANDLING AND PLACING

A. Before placing any concrete, all equipment for mixing and transporting the concrete should be clean, all debris and ice shall be removed from the spaces to be occupied by the concrete, and the reinforcement thoroughly cleaned of ice or other deleterious coatings. All accumulated water shall be removed from the place of deposit before concrete is placed. All surfaces of forms that will be in contact with the concrete shall be coated with non-staining mineral oil or other approved material.

B. The time interval between completion of mixing at the central plant and completion of discharge into the forms shall not exceed 90 minutes. The concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable and by methods which will prevent the separation or loss of the ingredients. Concrete shall be distributed by means of concrete buckets, buggies, short spouts, or as otherwise approved. Dropping the concrete a distance of more than five feet will not be permitted, unless suitable and approved equipment is provided to prevent segregation of the ingredients.

C. Concrete shall be thoroughly compacted during and immediately after depositing by vibrating, spading or rodding to insure dense, smooth concrete surfaces, thorough filling of the forms and embedment of reinforcing and inserts. All concrete shall be densified in place by means of internal type concrete vibrators. They shall be of sturdy construction, adequately powered, capable of transmitting pulsations to the concrete at a rate not less than 5,000 per minute, and shall produce vibrations of sufficient intensity to cause settlement of the concrete into place without segregation to the ingredients. Vibrators shall be held in one position only until concrete has become uniformly plastic and shall not continue to the extent that pools of mortar are formed. Vibrators shall not be used to push or distribute concrete laterally. They shall be withdrawn completely from the concrete before being advanced to the next position of application. Vibrators shall not be held against reinforcing steel. At least one vibrator shall be used for each 25 cubic yards of concrete being placed per hour, and additional vibrators shall be on hand for use in case of breakdown.

D. When the temperature is below 40º F during the 24-hour period after placing, adequate equipment shall be provided for heating the concrete materials and protecting the concrete against freezing. No frozen materials containing ice shall be used. Temperatures of the separate materials, including the mixing water, when placed in the mixer, shall not exceed 140º F. When placed in forms, the concrete shall have a temperature between 50º F and 70º F.

E. In hot weather, the average temperature of the concrete placed shall be less than 85º F. Concrete temperature shall be controlled by controlling the temperatures of the aggregates and mixing water and the use of crushed ice, if required.

F. Once concreting is commenced, it shall be carried on as a continuous operation until placing of the unit has been completed. Should stoppage of the concreting operations occur for any reason, construction joints shall be placed horizontally or vertically as required, provided with keys to resist shear and dowels to develop bond.

G. The top of the concrete shall be leveled by tamping, screening and preliminary wood floating. When the concrete has hardened sufficiently so that the water and fine material will not be worked to the top, the concrete surface shall be brought to an even plane, free from ridges, voids and depressions with no coarse aggregate visible. Final finish shall be a smooth trowel finish, without physical defects or voids.

3.3 CURING AND PROTECTION

A. All fresh concrete shall be protected from premature drying out by thoroughly sprinkling, wetting or flooding with potable water for a minimum period of seven days after placing. During this time, the temperature of the concrete shall not be allowed to fall below 50º F. In warm weather exposed concrete shall be protected from the direct rays of the sun by the use of burlap, continually wetted, by light colored, non-staining curing paper, lapped four inches and sealed conforming to ASTM C171.

B. This provision shall apply even though the use of a curing compound may have been approved. No special provisions for curing shall be required on surfaces where forms are left in place except that in extremely hot weather it may be required that the forms be wetted down to reduce surface heat. Fresh concrete shall be protected during or after a storm, by means of tarpaulins or otherwise until the concrete has set.

3.4 REINFORCEMENT

A. All definition details as to fabrication and placement of reinforcement, including shop placement drawings, and other factors entering into the concrete work shall conform to the latest edition of the American Concrete Institute Standard “Building Code Requirements for Reinforced Concrete” (ACI 318) and “Manual of Standard Practice for detailing Reinforced Concrete structures” (ACI 315).

B. All reinforcement, before being placed in position, shall be thoroughly cleaned of mill scale, rust or other coatings which will destroy or reduce the bond. Reinforcing steel reduced in section will be rejected.

C. Reinforcement shall be accurately positioned, shall be secured against displacement by tying at intersections with annealed wire or suitable clips, and shall be supported on plastic-tipped metal chairs or spacers, or metal hangers. Such supports shall be of sufficient strength to hold the reinforcement in place and support the weight of workmen during the placing of concrete, and be designed and used in such a manner that they will not be exposed in the face or in any way noticeable, or discolor the finish concrete surface.

3.5 FORMS

A. Forms shall conform to the shape, lines and dimensions of the members as called for on the Construction Drawings and shall be substantially free from surface defects, and sufficiently tight to prevent leakage or mortar. They shall be properly braced or tied together so as to maintain position and shape and shall be sufficiently rigid to sustain without vibration or excessive deflection the pressure from the fresh concrete together with the weight of the workmen, equipment and materials incidental to construction. Forms shall meet the requirements of ACI 347, “Recommended Practices for Concrete Formwork,” and ACI SP No. 4, “Formwork for Concrete.”

B. Suitable moldings or bevels shall be placed in the angles of forms to bevel the edges of the concrete exposed to view.

C. Tolerances shall be in conformance with ACI 318.

3.6 CONSTRUCTION JOINTS

A. Number, locations and details of construction joints shall be shown on the approved shop drawings.

B. Planes of construction joints shall be vertical and normal to the longitudinal axis of the bulkhead cap. Steel reinforcement shall be continuous through the construction joint.

3.7 EMBEDDED ITEMS

A. Number, locations and details of embedded items shall be shown on the approved shop drawings.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 37 26

UNDERWATER PLACED CONCRETE

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Work specified in this Section consists of furnishing and placing concrete in water for filling the drilled pipe piles and tremie concrete encasement for the permanent bulkhead lateral bracing, as indicated on the Construction Drawings, specified herein and as needed for a complete construction.

2. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed hereinafter in Part 1.3 of this Section, to the extent that the provisions of such documents are not in conflict with the requirements of these Technical Specifications.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Concrete Institute (ACI) 301, Standard Specifications for Structural Concrete.

2. ACI 304, Guide for Measuring, Mixing, Transporting and Placing Concrete.

3. ACI 304.2R, Placing Concrete by Pumping Methods.

4. American Society for Testing and Materials (ASTM) C94, Standard Specification for Ready-Mixed Concrete.

5. New York City Building Code (NYBC).

1.4 PAYMENT

A. Payment for all Work specified under this Section shall be made as part of the lump sum price bid for this Contract.

1.5 SUBMITTALS

A. Working drawings, shop drawings and material specifications shall be submitted to the Engineer for approval. Review of working drawings and shop drawings shall be for general considerations only. Compliance with specified requirements for materials and fabrication shall be the exclusive responsibility of the Contractor. Working drawings and shop drawings shall include, but not be limited to:

1. Method to be used for placing concrete under water;

2. Proposed concrete mix design including admixtures in accordance with ACI 301;

3. Manufacturer's technical data and instructions for manufactured materials and products. Furnish manufacturer's material certifications and laboratory test reports as requested by the Engineer; and

4. Certifications by the concrete supplier of conformance of design mixes in accordance with ASTM C94.

1.6 QUALITY ASSURANCE AND QUALIFICATIONS

A. Working and shop drawing reviews shall be obtained before custom fabrication is started and before delivery of materials to the Site.

B. The Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

C. The final responsibility for constructing concreting under water remains with the Contractor as part of the Work. Errors of detailing and fabrication and for the correct fit of the Work shall be the responsibility of the Contractor.

D. Defective work, as determined by the Engineer, shall be remedied to the Engineer's satisfaction. New acceptable work shall be provided at no additional expense to the Responsible Parties.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the Site in accordance with ACI 304 in an undamaged condition and at such intervals as will avoid delay in the Work.

1.8 FIELD MEASUREMENTS

A. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the Work shall be field verified. Variances and discrepancies from the Construction Drawings and potential interferences shall be reported promptly to the Engineer.

B. Sufficient field measurements shall be taken prior to preparation of shop drawings and fabrication of construction materials, where possible, to ensure proper fitting of the Work. However, job progress shall not be delayed. Allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the Work.

C. Actual field-verified conditions may require modifications to the fabrication and/or erection details indicated on the Construction Drawings. The Work shall be performed to meet actual field conditions encountered.

1.9 JOB CONDITIONS

A. Protection

1. Protect materials before, during and after concrete placement to ensure acceptable finished work. Protect in-place materials and other operations of the Work in connection with the concrete placement.

2. In the event of damage to the Work, make necessary repairs or replacements at no expense to the Responsible Parties.

3. Allow sufficient times, as determined by the Engineer from the approved schedule, between works for the various trades, to properly install their work.

PART 2: PRODUCTS

2.1 MATERIALS

A. Concrete strengths shown on the Construction Drawings and admixtures shall conform to Section 03 30 00 – Cast-in-Place Concrete.

B. The maximum size for aggregates used in concrete under water shall be 1 inch.

C. Due to the importance of maintaining as high a slump as possible for as long as possible, a high-range water-reducing admixture (HRWR) for massive placements shall not be used, unless slump loss testing has shown no detrimental results.

D. Air contents shall be 3% to 5%.

E. Slump shall be 7 to 10 inches.

F. Water/cement ratio shall be 0.40 maximum.

G. Minimum cementitious material shall be 660 pounds per cubic yard.

H. Concrete temperature during placement shall be less than 78º F, unless a higher placement temperature is shown by thermal analysis to have no detrimental effects on concrete strength.

PART 3: EXECUTION

3.1 PREPARATION

A. The areas and conditions under which the Work of this Section is to be performed shall be examined in coordination with the Engineer. Conditions detrimental to the proper and timely completion of the Work shall be corrected. The Work shall not proceed until unsatisfactory conditions have been corrected.

3.2 PLACING CONCRETE UNDER WATER

A. The Work in Connection with Other Sections and/or Contracts

1. The Contractor shall coordinate and/or provide for the installation of structural steel, inserts and all other embedded items required in the Work.

2. All embedded items required for adjoining work for its support shall be placed prior to concreting. No concrete shall be deposited until the Engineer or his authorized representative has given permission to place the concrete.

3. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

B. Concreting Under Water

1. Concreting under water shall be performed by the tremie method only, either by gravity flow or by pumping. Pumping of concrete shall be in accordance with ACI 304.2R. The tremie pipe shall be equipped with a bottom check valve or other device to prevent mixing of water or slurry with concrete within the tremie pipe.

2. Tremie pipes: The tremie shall be fabricated of heavy gauge steel pipe to withstand all anticipated handling stresses. Pipe with thicker walls or weighted pipe shall be used to overcome buoyancy problems. For deep placements the tremie shall be fabricated in sections with joints that allow the upper sections to be removed as the placement

progresses. Sections shall be jointed by flanged, bolted connections (with gaskets) or shall be screwed together. Whatever joint technique is selected, joints between tremie sections shall be watertight. The joint system selected shall be tested for water-tightness before beginning placement. The tremie pipe shall be marked to allow quick determination of the distance from the surface of the water to the mouth of the tremie.

3. The tremie shall be provided with a suitably sized funnel or hopper to facilitate transfer of sufficient concrete from the delivery devices to the tremie. A stable platform shall be provided to support the tremie during placement. The platform shall be capable of supporting the tremie while sections are being removed from the upper end of the tremie.

4. Placement procedures: All areas in which there is a bond between steel, wood or hardened concrete and fresh concrete shall be thoroughly cleaned immediately prior to beginning concrete placement.

5. Pipe Spacing: Pipe spacing shall be no more than about 10 feet on centers. Actual pipe spacing shall be established on the basis of the thickness of the placement, congestion due to piles or reinforcing steel, the available concrete production capacity, and the available capacity to transfer concrete to the tremies.

6. Starting Placements

    a. Tremies started using the end plate, dry pipe technique shall be filled with concrete before being raised off the bottom. The tremie shall then be raised a maximum of 6 inches to initiate flow. These tremies shall not be lifted further until a mound is established around the mouth of the tremie pipe. Initial lifting of the tremie shall be done slowly to minimize disturbance of material surrounding the mouth of the tremie.

    b. Tremies started using a go-devil shall be lifted a maximum of 6 inches to allow water to escape. Concrete shall be added to the tremie slowly to force the go-devil downward. Once the go-devil reaches the mouth of the tremie, the tremie shall be lifted enough to allow the go-devil to escape. After that, a tremie shall not be lifted again until a sufficient mound is established around the mouth of the tremie.

    c. Tremies shall be embedded in the fresh concrete from 3 to 5 feet. Exact embedment depths shall depend upon placement rates and setting time of the concrete. All vertical movements of the tremie pipe shall be done slowly and carefully to prevent loss of seal. If loss of seal occurs in a tremie, placement through that tremie shall be halted immediately. The tremie shall be removed, the end plate shall be replaced, and flow shall be restarted as described above. To prevent washing of concrete in place, a go-devil shall not be used to restart a tremie after “loss of seal.”

    d. The Contractor shall make adequate arrangements to prevent any wet concrete spill into open water during concrete placement in any underwater structure. A temporary containment system shall be installed outside such structure to capture excess concrete and concrete-contaminated water flowing out of pile casing during concrete placement. Additionally a suitable pump can be deployed to simultaneously pump out the concrete-contaminated water and excess concrete during concrete placement. Concrete or concrete-contaminated water collected from this process shall be handled and disposed of in accordance with all applicable regulations and project specifications.

e. In the event of a concrete spill into open water, concrete pouring shall cease; spilled concrete shall be removed from the waterbody before pouring recommences.

f. The pH of concrete-contaminated water should be tested before such water is discharged. If the pH of such water is either above 9.0 pH units or below 6.0 pH units, such water should be treated to bring its pH within such a range prior to discharge.

7. Placing

a. Concrete placement shall be as continuous as possible through each tremie. Excessive delays in placement shall allow the concrete to stiffen and resist flow once placement resumes. Placement interruptions of up to approximately 30 minutes shall allow restarting without any special procedures. Interruptions of between 30 minutes and the initial setting time of the concrete shall be treated by removing, resealing, and restarting the tremie.

b. The volume of concrete in place shall be monitored throughout the placement.

c. Tremie blockages which occur during placement shall be cleared carefully to prevent loss of seal. If a blockage occurs, the tremie shall be quickly raised 6 inches to 2 feet and then lowered in an attempt to dislodge the blockage. The depth of pipe embedment shall be closely monitored during all such attempts. If the blockage cannot be cleared readily, the tremie shall be removed, cleared, resealed, and restarted.

8. Horizontal distribution of concrete: The pipe delivering concrete shall remain fixed horizontally while concrete is flowing. Horizontal movement of the pipe will damage the surface of the concrete in place, create additional laitance, and lead to loss of seal. Horizontal distribution of the concrete shall be accomplished by flow of the concrete after exiting the pipe or by halting placement, moving the pipe, reestablishing the seal, and resuming placement.

a. Two methods shall be used to achieve horizontal concrete distribution in large placements: viz, the layer method, or the advancing slope method. In the horizontal layer method the entire area of the placement is concreted simultaneously using a number of tremies. With the advancing slope method, one portion of the placement is brought to finished grade and then the tremies are moved to bring adjacent low areas to grade. Work normally progresses from one end of a large placement.

3.3 DIRECT PUMPING

1. Tremie placement techniques are generally applicable to direct pump placement under water with the following differences:

a. Pipes are typically smaller than those used for tremies. Rigid sections shall be used for the portion actually embedded in the concrete; and

b. A relief valve (air vent) shall be required near the highest point in the pipeline to prevent development of a vacuum blockage.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 05 13.1

GALVANIZING

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Technical Specification covers all iron or steel materials which are to be galvanized, where galvanizing is called for on the Construction Drawings.

2. All galvanizing shall be done by the hot-dip process.

1.2 RELATED SECTIONS (NOT USED)

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Society for Testing and Materials (ASTM) A53, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

2. ASTM A90, Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

3. ASTM A111, Zinc-Coated (Galvanized) “Iron” Telephone and Telegraph Wire.

4. ASTM A116, Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

5. ASTM A121, Zinc-Coated (Galvanized) Steel Barbed Wire.

6. ASTM A123, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

7. ASTM A143, Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

8. ASTM A153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

9. ASTM A239, Test Method for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip).

10. ASTM A384, Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

11. ASTM A385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

12. ASTM A392, Zinc-Coated Steel Chain-Link Fence Fabric.

13. ASTM A475, Zinc-Coated Steel Wire Strand.

14. ASTM A653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

15. ASTM A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

16. ASTM A924, General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

17. ASTM B6, Specification for Zinc.

18. ASTM E536, Test Methods for Chemical Analysis of Zinc and Zinc Alloys.
19. American National Standards Institute (ANSI) C80.1, Rigid Steel Conduit, Zinc Coated.
20. CSA Group (CSA) G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.
21. American Galvanizers Association (AGA) Quality Assurance Manual.

1.4 TESTS

A. General: Samples of galvanized articles shall be taken as specified in the appropriate ASTMs listed in Table 1. Galvanized articles shall be tested to determine the following qualities of the coating:

1. Thickness of coating;
2. Adherence; and
3. Uniformity.

B. Thickness of the zinc coating may be tested either by the weighing or stripping methods in conformity with the requirements set forth in Table 1.

C. Adherence of zinc coating shall be tested by the method indicated in the appropriate ASTM specifications listed in Table 1.

D. Uniformity

1. Galvanized articles will be subjected to visual examination to determine uniformity of work.
2. In the event the Engineer determines that such examination is not conclusive, the article shall be given the Preece test in conformity with ASTM A239.

1.5 SUBMITTALS

A. The Contractor shall submit to the Engineer the producer's or supplier's certification that the galvanized articles were manufactured, sampled, tested and inspected in accordance with the applicable standards specified herein, and that the articles meet these requirements.

B. When specified in the Technical Specifications, a report of the test results shall be furnished to the Engineer.

1.6 QUALIFICATIONS

A. Galvanizing shall be done in a plant having sufficient facilities to produce the quality of coatings herein specified and ample capacity for the volume of work required.

B. The plant shall follow the procedures in the Quality Assurance Manual of the AGA.

1.7 SHIPPING AND HANDLING

A. Galvanized articles shall be shipped and handled in a manner which will avoid damage to the zinc coating.

PART 2: PRODUCTS

2.1 MATERIALS

A. Zinc used for galvanizing shall conform to ASTM B6, and shall be at least equal to the grade designated as Prime Western.

B. Maximum amount of aluminum added to a galvanizing bath shall not exceed 0.01%.

PART 3: EXECUTION

3.1 PREPARATION OF MATERIALS

A. Structural steel products shall be safeguarded against embrittlement in accordance with ASTM A143.

B. Casting surfaces to be galvanized shall be sand blasted or ground smooth. When a smooth cast is required, castings shall be tumbled and all high spots ground flush. Castings shall be normalized to prevent cracking. Malleable iron shall be safeguarded against embrittlement by pre-annealing.

C. Steel work shall be pre-cleaned utilizing a caustic bath, acid pickle and flux or shall be blast cleaned and fluxed to obtain an acceptable surface for quality hot dip galvanizing.

3.2 METHOD OF GALVANIZING

A. All galvanizing shall be done by the hot-dip process in conformity with the appropriate ASTM specifications listed in Table 1.

B. Methods tending to agitate the dross shall not be used, and materials shall not contact the dross at any time.

C. Chemical analysis for impurities in the bath shall be made in conformity with ASTM E536.

3.3 SCHEDULE OF REQUIREMENTS

A. Table 1: Schedule of Hot-Dip Galvanizing Requirements

1. The Work shall conform to the requirements of the tabulated standards in Table 1.

B. Notes Applicable to Table 1

1. Prefixes A, B and E identify ASTM specifications; prefix G identifies CSA standards.

2. Where coating thicknesses are referenced to a table in the ASTMs, the coating thickness for the galvanized articles shall conform to the requirements given in the Technical Specifications.

3. Galvanized articles shall not be subject to wiping or scraping processes which may reduce the thickness of zinc coating.

4. Small hardware items shall be centrifuged to remove excess bath metal.

C. Quality of Coating

1. The zinc coating shall meet the standards set forth in Table 1, ASTM A385. The coating shall adhere firmly to the surface of the base metal, be continuous and uniform in thickness, and of the quality of finish specified.

2. All rejected materials shall be stripped and re-galvanized before resubmitting for inspection and test.

3.4 REPAIR OF GALVANIZED COATINGS

A. Galvanized coatings that are abraded or damaged shall be repaired in accordance with ASTM A780.

B. The extent of the area to be repaired and the method of repair to be used shall be approved by the Engineer.

TABLE 1 - SCHEDULE OF HOT-DIP GALVANIZING REQUIREMENTS

CLASS OF WORK	ZINC		TEST OF ZINC COATING				COATING THICKNESS
	Slab & Chemical Analysis	Coating	Thickness		Adherence	Uniformity	Oz. Per Sq. Ft.
			By Weight	By Stripping			Minimum
IRON & STEEL STRUCTURAL $ Rolled, pressed and forged, shapes, castings, plates, bars and strips $ Gratings, iron and steel	B6, E536	A123	A123	A90, G164-M	A123	A123, A239	Table 1, A123
SHEETS $ Iron and steel	B6, E536	A653	A653, A924	A90, A924	A653	A239	Table 1, A653
HARDWARE $ Castings of malleable iron and steel $ Rolled, pressed, forged articles $ Threaded fasteners $ Very small work: rivets, nails, tacks, pins, small bolts and screws, stove bolts $ Turnbuckles and similar work $ Chain	B6, E536	A153	A153	A90, G164-M	A153	A153, A239	Table 1, A153
WIRE $ Line wire $ Fencing wire $ Fencing fabric, chain link $ Barbed wire $ Strand wire	B6, E536 B6, E536 B6, E536 B6, E536 B6, E563	A111 A116 A392 A121 A475	-- -- -- -- --	A90 A90 A90 A90 A90	A111 -- -- -- A475	A111 -- -- -- A475	Table 1, A111 Table 3, A116 Tables 1 and 2, A392 Table 3, A121 Table 4, A475
PIPE	B6, E536	A53	--	A90	A53	--	1.8 oz. per sq. ft

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 12 34

STRUCTURAL STEEL PERMANENT LATERAL BRACING

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall furnish all equipment, materials, and services for the fabrication, delivery, unloading, handling, storing, and erection of all structural steel permanent bracing and steel core beams in drilled pipe piles, as shown on the Construction Drawings and called for in the Technical Specifications.

2. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed in Part 1.4 of this Section, to the extent that the provisions of such documents are not in conflict with the requirements of this Technical Specification.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 05 05 13.1 – Galvanizing

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Society for Testing and Materials (ASTM) A6, General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling.

2. ASTM A36, Carbon Structural Steel.

3. ASTM A53, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

4. ASTM A325, Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

5. ASTM A563, Carbon and Alloy Steel Nuts.

6. ASTM A572, High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

7. ASTM A992, Standard Specification for Steel for Structural Shapes for Use in Building Framing.

8. ASTM F436, Hardened Steel Washers.

9. American National Standards Institute (ANSI) B18.2.1, Square and Hex Bolts and Screws-Inch Series.

10. ANSI/American Society of Mechanical Engineers (ASME) B18.2.2, Square and Hex Nuts (Inch Series).

11. ANSI/American Welding Society (AWS) A5.1, Carbon Steel Covered Arc-Welding Electrodes.

12. ANSI/AWS A5.5, Low-Alloy Steel Covered Arc-Welding Electrodes.

13. ANSI/AWS A5.9, Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored and Stranded Arc Welding Electrodes and Welding Rods.

14. ANSI/AWS A5.17, Carbon Steel Electrodes and Fluxes for Submerged-Arc Welding.
15. ANSI/AWS A5.18, Filler Metals for Gas Shielded Arc Welding, Carbon Steel.
16. ANSI/AWS A5.23, Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.
17. ANSI/AWS D1.1, Structural Welding Code.
18. ANSI/AWS QC1, Qualification and Certification of Welding Inspectors.
19. NY Spec 20-S-35, Steel Plates, Shapes, and Bars; Carbon Structural.
20. American Institute of Steel Construction (AISC).
    a. Code of Standard Practice for Steel Buildings and Bridges.
    b. Commentary of the AISC Specification.
    c. Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
21. Steel Structures Painting Council (SSPC).

1.4 DEFINITION

A. Structural Steel: The term structural steel shall be as defined in the Codes of Standard Practice for Steel Buildings and Bridges of the AISC. Included as structural steel shall be all stiffeners, plates, sag rods and other miscellaneous metal required for a complete installation.

1.5 SUBMITTALS

A. The Contractor shall submit working drawings, shop drawings and material specifications for the approval of the Engineer in accordance with the requirements of the Section 01 33 00 – Submittal Procedures. Working drawings and shop drawings shall include, but not be limited to:
    1. Layout drawings indicating all materials, structural shapes, sizes, and dimensions; and
    2. Detail drawings indicating connection and anchoring details.

B. No fabrication shall be started until working drawings and shop drawings have been approved in writing by the Engineer.

C. The Contractor shall also submit the following:
    1. Certified mill test reports;
    2. Affidavit of compliance with grade specified;
    3. Certified weld inspection reports;
    4. Coating certification; and
    5. Quality certifications for fabricators and erectors.

D. The Contractor shall furnish samples for testing, if requested by the Engineer.

1.6 QUALITY ASSURANCE

A. All fabrication and erection shall be performed by AISC Quality Certified Companies.

B. All welding shall be performed by certified welders under the immediate supervision of a representative of an independent standard testing agency or an inspection agency reporting directly to the Engineer.

C. The Contractor shall submit the name of such testing agency for approval before starting the Work.

1. All shop and field welds in structural steel shall be visually inspected by an AWS qualified welding inspector. The Contractor shall furnish a letter of certification for each welded connection stating that these requirements have been met.

2. The costs of all welding supervision and inspections shall be borne by the Contractor. The Contractor shall engage inspectors to inspect welded connections and to perform tests and prepare test reports.

3. Ten percent (10%) of all butt and bevel welds which extend continuously for 24 inches or less will be completely tested in accordance with AWS D1.1, Part B, Radiographic Testing of Welds, Chapter 6. All butt and bevel welds which extend continuously for more than 24 inches will be spot tested at intervals not exceeding 36 inches.

4. Welds that are required by the Engineer and/or inspectors to be corrected shall be corrected or redone and retested as directed, at the Contractor's expense and to the satisfaction of the Engineer and/or an acceptable independent testing lab.

D. The Contractor shall be solely responsible for the correctness of all shop and field fabrication and fit.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Structural members shall be loaded in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

B. Structural steel members and packaged materials shall be protected from corrosion and deterioration. Material shall be stored in a dry area.

C. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.

D. Materials shall not be placed on the structure in a manner that might cause distortion or damage to the members or the supporting structures. The Contractor shall repair or replace damaged materials or structures as directed by the Engineer.

1.8 FIELD MEASUREMENTS

A. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the Work.

B. The Contractor shall review the Construction Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

PART 2: PRODUCTS

2.1 STRUCTURAL STEEL PERMANENT LATERAL BRACING

A. The fabricator shall provide an affidavit stating that the structural steel furnished meets the requirements of the grade specified. All unidentified steel will be rejected and shall be removed from the Site and replaced by the Contractor, at no additional cost to the Responsible Parties.

B. Structural steel for W shapes shall conform to ASTM A992 unless otherwise indicated.

C. Structural steel for S, M, and HP shapes and channels shall conform to ASTM A572 Grade 50 unless otherwise indicated.

D. Structural steel for angles and plates shall conform to ASTM A36 unless otherwise indicated.

E. Certified mill test reports or certified reports of tests made by the fabricator or a testing laboratory for structural steel shall be in accordance with ASTM A6, and the governing specification shall constitute evidence of conformity with the ASTM specification.

F. Steel pipe struts shall be modified according to ASTM A572, Grade 3 steel, with F_y = 50 kilopounds per square inch (ksi).

G. Structural steel for permanent lateral bracing shall be galvanized in accordance with Section 05 05 13.1 – Galvanizing.

2.2 BOLTS

A. High strength bolts shall conform to ASTM A325, unless otherwise indicated.

B. Galvanized high strength bolts shall conform to ASTM A325, Type 1, and nuts shall conform to ASTM A563. Galvanizing shall be by the hot-dip process and in accordance with Section 05 05 13.1 – Galvanizing.

1. Flat circular washers and square or rectangular beveled washers shall conform to the requirements of ASTM F436.

2. Bolt dimensions shall conform to the requirements for regular semi-finished hexagon bolts, ANSI B18.2.1, unless otherwise specified.

3. Nut dimensions shall conform to requirements for heavy hexagon semi-finished nuts ANSI/ASME B18.2.2. Washers shall be flat and smooth and their dimensions shall conform to the requirements for heavy plain washers, ANSI B18.22.1.

C. Bolts not manufactured in the United States shall be tested and certification provided with respect to specified and required quality and strength standards. Certification of origin shall be provided for all United States fasteners. Bolts to be tested will be randomly selected in the field by the Engineer.

2.3 WELDING ELECTRODES

A. Welding electrodes for manual shielded metal arc welding shall conform to ANSI/AWS A5.1. Carbon steel electrodes and granular flux for the submerged-arc welding process shall conform to ANSI/AWS A5.17 and low-alloy steel electrodes and fluxes for submerged arc-welding shall conform to ANSI/AWS A5.23 as required for the conditions of actual use.

B. Welding electrodes for ASTM A36 steel shall comply with ANSI/AWS A5.1 [minimum tensile strength of 72,000 pounds per square inch (psi)] and shall be E70XX.

C. Welding electrodes for ASTM A588, ASTM A572, and ASTM A992 steel shall comply with ANSI/AWS A5.17 (tensile strength range of 70,000 psi to 95,000 psi).

D. Gas-welding electrodes for steel shall comply with ANSI/AWS A5.18 (minimum yield strength of 60,000 psi).

2.4 STEEL CORE BEAMS

A. Steel core beams shall be new and conform to the requirements of ASTM A572 or ASTM A992, Grade 50 Steel.

B. The steel core beams shall be galvanized in accordance with the requirements of Section 05 05 13.1 – Galvanizing.

PART 3: EXECUTION

3.1 FABRICATION

A. Fabrication shall be in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges, the Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design.

B. Bolt Holes

1. All holes in structural steel members required for bolt holes shall be provided by the fabricator and detailed on the shop drawings.

2. Where misalignment between bolts and bolt holes in steel members is encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misalignment, for review by the Engineer.

C. All materials shall be properly worked and match-marked for field assembly. Where finishing is required, assembly shall be completed including bolting and welding of units before start of finishing operations.

D. Where shop assembly of field connections is shown, specified or required, the unmatched holes shall be reamed and the pieces match marked before disassembly. The interchange of matching parts will not be permitted.

3.2 ERECTION

A. The erection of all structural steel shall conform to the applicable requirements of the Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the AISC.

B. All field connections shall be accurately fitted up before being bolted. Drifting shall be only such as will bring the parts into position and shall not be sufficient to enlarge the holes or to distort the metal. All unfair holes shall be drilled or reamed.

C. Cutting and Burning: The use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on major members. Its use may be permitted on minor members if the member is not under stress, and only after the written approval from the Engineer has been obtained.

1. No cutting of structural steel members in the field will be allowed except by written approval of the Engineer.

2. All cutting shall be done with an oxyacetylene torch.

D. Welding

1. Welding shall be performed in accordance with the requirements of AWS D1.1 Structural Welding Code.

2. In assembly and during welding, the component parts of built-up work shall be held in place by sufficient clamps, temporary bolts or other adequate means to keep parts in proper position. Where temporary bolts are used to hold the parts together in steel plates or similar work, the temporary bolts shall be removed and the holes shall be filled with welding material where practical. Otherwise, the nuts shall be tightened and the bolt threads outside the unit shall be burned and the bolt peened to prevent the nut from loosening.

E. Misfits at Bolted Connections

1. Where misfits in erection bolting are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misfit for review by the Engineer, and the Engineer will determine whether the remedy is acceptable or if the member must be refabricated.

2. Incorrectly sized or misaligned holes in members shall not be enlarged by burning or by the use of drift pins. The Contractor shall notify the Engineer immediately and shall submit a proposed method of remedy for review by the Engineer.

3.3 ASSEMBLY

A. Structural members shall be set accurately to the lines and elevations indicated on the Construction Drawings. The various members shall be aligned and adjusted to form a part of a complete bracing system before being permanently fastened or set in place. Necessary adjustments to compensate for discrepancies in elevations and alignments shall be performed, subject to the approval of the Engineer.

B. Individual members of the bracing shall be leveled within AISC tolerances. The Contractor shall provide and install all temporary supports required until structure is complete.

3.4 GALVANIZING

A. General Requirements

1. Structural steel work shall be coated in accordance with Section 05 05 13.1 – Galvanizing. All galvanizing performed at the fabricator's shop shall be subject to inspection by the Engineer, and all parts of the Work shall be made accessible to the Engineer.

2. All structural steel work specified to be galvanized shall be sand blasted or wheelabrated, by the fabricator, of loose mill scale, loose rust, weld slag or flux deposit, dirt and other foreign matter to satisfy the following specifications of the SSPC:

a. SSPC SP-10, Near-White Blast Cleaning.

3. Cleaned steel shall be primed within 6 hours after cleaning to prevent formation of new rust.

B. Finished Surfaces: Machine finished surfaces with zero clearance metal to metal contact shall be protected against corrosion by rust-inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

C. Field Welds: Surfaces within 2 inches of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes while welding is being done.

D. Defective Work: The Contractor shall correct such Work found defective under this Specification at no additional cost to the Responsible Parties.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 09 96 56

EPOXY COATINGS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. Coating, as specified herein, shall include, but not be limited to, preparation of surfaces, shop coating of items furnished and field coating of members.

2. Coating shall be provided where shown on the Construction Drawings, specified herein, or as required for a complete installation.

3. Testing and inspection of coating by an approved independent testing agency.

4. Field touch-up application of coatings as required.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. Steel Structures Painting Council (SSPC) Manual

a. SSPC-SP1

b. SSPC-SP2

c. SSPC-SP3

d. SSPC-SP10

e. SSPC-SP11

f. SSPC-PA1

g. SSPC-PA2

2. Federal Specifications and Standards of the General Services Administration

a. TT-C-542F

3. Specifications and Standards of the Department of Defense of the United States Government

a. MIL-C-22750F

b. MIL-P-23377G

4. American Society for Testing Materials (ASTM)

a. ASTM D3359, Measuring Adhesion by Tape Test

b. ASTM D4417, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

1.4 SUBMITTALS

A. The Contractor shall prepare and submit for approval catalog cuts and reference materials in accordance with Section 01 33 00 – Submittal Procedures.

1. Color Chart

    a. The Contractor shall submit the manufacturer's standard color chart for color selection for coating of items.

2. Coated Surface Samples

    a. Upon request, duplicate samples of the results obtained by coating and finishing various materials on the Work shall be submitted. Such samples, and the approved coating applied thereto, shall be applied in strict conformance with these Technical Specifications. All coating work shall be performed in a quality equal to the approved samples.

3. Manufacturer Certification

    a. The Contractor shall furnish affidavits from the manufacturer certifying that the sheet piles have been cleaned in accordance with the specified procedures, coatings have been applied to the specified thickness, material furnished conform to the requirements specified and that coating products have been checked for compatibility.

4. Immersion Certification

    a. The Contractor shall furnish affidavits from the manufacturer certifying that coatings in immersion service contain no water soluble solvents or corrosion inhibitive (active) pigments with slight water solubility.

5. Supplementary Schedule

    a. The Contractor shall submit a supplementary schedule of coating products with mil thickness, and solids by volume, including all coating applied in the shop and in the field. The schedule shall be in accordance with the recommendations of the coating manufacturer.

6. Name of independent testing laboratory which the Contractor proposes to retain to inspect the blast cleaning of sheet piles and coating thickness.

7. Type of coating system to be used for making field touch-up of coating.

1.5 QUALITY ASSURANCE

A. The Contractor shall appoint and pay for an independent testing agency, approved by the Engineer, to inspect the coating in accordance with the coating manufacturer's recommendations and the requirements of the Technical Specifications.

B. Coating Quality Assurance Records

1. The following information shall be recorded for coating project:

    a. Date;

    b. Paint Batch Number/s;

    c. Holiday Test Results and Repair Data; and

    d. Peel Test Results and Repair Data.

1.6 SAFETY REQUIREMENTS

A. All coating materials specified herein, and ingredients of coatings containing substances that are potentially toxic or hazardous shall be shipped with warning labels. These products shall be applied in strict conformance with the safety requirements of the following:

1. The Manufacturer;
2. The National Paint and Coatings Association (NPCA);
3. The Society of the Plastics Industry (SPI);
4. The Manufacturing Chemist Association (MCA);
5. The Steel Structures Painting Council (SSPC);
6. The United States Government Occupational Safety and Health Act (OSHA); and
7. The Health and Safety Requirements of the State of New York.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General

1. All products and materials shall be delivered, stored, and handled as specified as follows.

B. Delivery and Storage

1. All paint materials delivered and stored at the Site shall be from the approved manufacturer only.

C. Packaging and Labeling

1. Paints to be used on the job shall be properly prepared, packed, and labeled. All material shall be delivered to the Site in original, unbroken containers bearing the manufacturer's printed labels, which shall specify the following:

a. Project and Contract No.;
b. Name of Manufacturer;
c. Address of Manufacturer;
d. Generic Name of Paint or Ingredients;
e. Brand and Trade Mark;
f. Schedule Letter as Listed Herein;
g. Percent Solids by Volume;
h. Net Quantity;
i. Date of Manufacturer; and
j. Date Packed.

D. Storage

1. Painting materials shall be stored at the Site in a manner and place which shall be in accordance with applicable codes and regulations, and in accordance with manufacturer's instructions. The storage space shall be kept clean at all times. Every precaution shall be exercised to eliminate fire hazards.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95° F.

B. Do not apply coatings when relative humidity exceeds 85%, at temperatures less than 5° F above the dew point, or to damp or wet surfaces.

C. Do not apply coatings in snow, rain, fog or mist.

PART 2: PRODUCTS

2.1 MANUFACTURERS

A. Latest Products

1. Unless specified otherwise, the proprietary protective coatings of the manufacturer's latest products in regular production on the date of receipt of order shall be provided.

B. Coating Manufacturers

1. Sherwin Williams, Cleveland, OH
2. Carboline Company, St. Louis, MO

2.2 MATERIALS

A. General

1. Coating and other materials shall be furnished which are of the type and quality of the manufacturer specified herein is based.

B. Compatible shop and field coats shall be provided.

C. All coats of paint for any particular surface shall be from the same manufacturer.

D. Coating shall be of approved color as selected from the manufacturer's standard range of colors.

E. Coatings containing lead or manganese driers shall not be used.

F. Ingredients of coatings shall, unless proprietary coatings are specified, conform to the latest editions of the following:

1. Federal Specifications and Standards of the General Services Administration of the United States Government ("Fed. Spec"); and
2. Specifications and Standards of the Department of Defense of the United States Government ("Mil. Specs").

G. Material Coating Schedule

1. All materials shall be painted in accordance with the following schedule. The number of coats shall not be less than the number shown on the schedule.

MATERIAL COATING SCHEDULE			
ITEM	**Coating Symbols****		
	Prime Coat	**Finish Coats**	
		1st	**2nd**
Steel Pipe Piles	B	A	A

**See Schedule of Paints for corresponding product.

H. Schedule of Paints

1. Alphabetical designations in the following list are given solely for the purpose of indicating the type and quality of materials desired.

Symbol	Product Name
A	**Carboline**: Bitumastic 300M
A	**Sherwin Williams**: TarGuard Coal Tar Epoxy
B	**Carboline:** Carbozinc 11

I. Touch-up coatings for repair of coating defects and damage shall be as recommended by the coating manufacturer and approved by the Engineer.

PART 3: EXECUTION

3.1 CLEANING AND SURFACE PREPARATION

A. Cleaning and Surface Preparation

1. Prior to applying coating, surface cleaning and preparation shall be in accordance with the following schedule and as recommended by the coating material manufacturer.

SURFACE PREPARATION SCHEDULE	
Class of Work	**Preparation of Surface Prior to Coating**
Steel Submerged Under Water	All visible oil, grease, dirt, dust, mill scale, slag, flux deposits, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, abrasive blasting, or other specified method. Discoloration caused by certain stains shall be limited to no more than 5% of each square inch of surface area in accordance with Steel Structures Painting Council SSPC-SP10.
Galvanized Steel and Other Metals	All welds, beads, blisters or protuberances, other than identification markings shall be smooth, and other imperfections shall be removed. All nonferrous metals and galvanized steel, whether shop primed or field primed, shall be solvent cleaned in accordance with Steel Structures Painting Council SSPC-SP1.

B. Abrasive Blasting

1. Perform abrasive blasting in accordance with SSPC-SP10 using a production line shot and grit blast machine or by air blast. Maintain the abrasive work mix such that the final surface profile is within the range of 2 to 3 mils. Use SSPC-VIS 1 to evaluate degree of cleaning. Measure the surface profile of each pile using Testex replica tape in accordance with ASTM D4417. Retain the impressed tapes and file with the Quality Control inspection records. Do not conduct surface preparation when the surface temperature is less than 5° F above the dew point.

3.2 COATING APPLICATION

A. General

1. All coatings shall be applied in accordance with the requirements of this Section, SSPC PA1, the manufacturer's recommendations and approved submittals. In the event of a conflict between the manufacturer's technical data and the requirements of this Section,

comply with this Section unless the requirements of the manufacturer are more restrictive. In these cases, advise the Engineer of the conflict in writing and comply with the Engineer's written instructions.

B. A representative of the coating manufacturer shall inspect the surfaces to be coated and shall advise on the proper application. The coating manufacturer representative shall periodically be consulted regarding ambient temperature and humidity conditions.

C. Quality of Surface Preparation and Time Restrictions Prior to Coating

1. Verify that the surface exhibits the specified degree of cleaning immediately prior to coating. Re-clean deficient areas. Do not apply coating unless the prepared surface is inspected by the approved testing agency. Apply the first coat within 12 hours of cleaning to bare metal. If the bare substrate is allowed to remain uncoated for more than 12 hours or if re-rusting is evident, re-clean the surface prior to painting.

D. Surface Cleanliness Prior to Coating and Between Coats

1. Do not perform coating application in areas where dust is being generated. Thoroughly clean the surface of each coat prior to the application of the next to remove dirt, dust or other deleterious materials. Clean the surfaces by vacuuming or blowing with compressed air. If grease or oil has become deposited on the bare steel or on the surface of any of the applied coats, remove by solvent cleaning in accordance with SSPC-SP1 prior to the application of the next coat. Use a solvent that is acceptable to the coating manufacturer.

E. Coating Thickness

1. Apply materials to establish dry film thickness values in accordance with the requirements of this Section. Measure dry film thickness in accordance with SSPC PA2.

F. Performance Requirements

1. The cured coating shall be of uniform gloss and thickness and shall be free of blisters, pinholes, fisheyes, sags, runs and any other irregularities. The dry film thickness of the coating system shall be a minimum of 16 mils at any point. Test for continuity of coating with a holiday tester of 100 volts or less. Repair all holidays detected and retest to confirm repair. All coats shall be well adhered to each other and to the substrate. Perform adhesion tests in accordance with ASTM D3359 and repair all test areas. Remove all defective coating and re-blast and recoat such areas in accordance with the requirements of this Section. Maintain quality control records of the results of inspections and submit results to the Engineer.

G. Repair of Damaged and Unacceptable Coatings Before and After Installation

1. Repair localized damage, corrosion and unacceptable coatings. Prepare the surface by cleaning in accordance with SSPC-SP1 followed by SSPC-SP2 or SSPC-SP3. Use a solvent that is acceptable to the coating manufacturer. For previously blast-cleaned steel, if the damage exposes the substrate, remove all loose material and prepare the steel in accordance with SSPC-SP11.

H. Surface Preparation of Extensive Areas

1. Repair extensive areas of damage or unacceptable coating by methods acceptable to the Engineer, based on the nature of the defect.

I. Feathering of Repair Areas

1. Feather the existing coatings surrounding each repair location. Feather for a distance of 1 to 2 inches to provide a smooth, tapered transition into the coating. Verify that the edges of coating around the periphery of the repair areas are tight and intact by probing with a putty knife in accordance with the requirements of SSPC-SP3. Roughen the existing coating in the feathered area to assure proper adhesion of the repair coats.

J. Coating Application in Repair Areas

1. When the bare substrate is exposed in the repair area, reapply all coats of the system to the specified thickness. When the damage does not extend to the bare substrate, reapply only the affected coats. Maintain the thickness of the system in overlap areas within the specified total thickness tolerances.

K. Field Touch-Up

1. For field touch-up after installation, use touch-up coatings as recommended by the coating manufacturer and approved by the Engineer.

3.3 PROTECTION

A. Ensure that coated items are not shipped until fully cured. Protect all fully coated and cured items from handling and shipping damages using padded slings, dunnage, separators and tie-downs. The Contractor shall touch up and restore any finish damaged.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 09 13

GEOTECHNICAL INSTRUMENTATION AND MONITORING

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. Under this Section, the Contractor shall provide all design, labor, materials, tools and equipment, and perform all operations necessary for furnishing, installing, recording, interpreting, protecting, maintaining, and removing monitoring devices used to monitor soil and structure movements, and vibrations specified herein, on the Construction Drawings, and as approved by the Engineer. This Work also includes preparing a detailed monitoring and instrumentation program and recording and reducing of data. The Contractor shall implement required remedial and precautionary measures based on the results of the monitoring.

2. The Work shall be in conformance with all applicable Federal, State and local regulatory requirements.

3. The Contractor shall perform pre-construction and post-construction condition surveys of all buildings and other structures within the zone of influence of his construction operations.

4. The Contractor shall use all the approved methods required to maintain the existing buildings and structures at their preconstruction conditions and elevations. At all times, maintenance, safety and protection of all buildings and structures influenced by the construction shall be the responsibility of the Contractor. The Contractor shall provide the necessary instruments and make the measurements required to record conditions and elevations and to detect and measure any settlement or damage to buildings and structures that may occur over the duration of this Work. The Contractor shall record and post the monitoring data on a website, and furnish written reports, photographs, video recordings and other documentation concerning settlement or movement of the buildings and structures to be examined and monitored under this Work.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 31 23 16 – Excavation

C. Section 31 53 01 – Lateral Bracing for Excavation

D. Section 31 63 34 – Drilled Steel Pipe Piles

1.3 REFERENCES (NOT USED)

1.4 RESPONSIBILITIES OF THE CONTRACTOR

A. Prepare a detailed Monitoring and Instrumentation Program and furnish all instrumentation that is to be installed.

B. Furnish all readout or data logging units as required.

C. Install monitoring instruments.

D. Protect from damage and maintain all installed instruments. Repair or replace instruments which become damaged or inoperative as a consequence and during the Work.

E. Maintain and calibrate portable readout and data logging units.

F. Collect, reduce, process, and report data from instruments to the Engineer. Set up a monitoring website and post all data in the form of graphs, charts and/or tables on a daily basis.

G. Coordinate with the Engineer to verify consistency of collected data.

H. Implement remedial measures based on interpretations of monitoring data.

I. Extend instrument casings and leads, re-install surface protection and other protective devices, and re-survey instrument reference elevations as necessary due to grade changes and ground movements.

J. Perform a pre-construction and post-construction condition survey of buildings and structures and prepare reports.

1.5 COORDINATION

A. The Contractor shall coordinate monitoring with installation of steel pipe piles, excavation, and the construction of all underground structures.

B. The Contractor shall review installation procedures under other Sections and coordinate them with the Work specified herein.

1.6 QUALITY ASSURANCE

A. Standards

1. The Contractor shall comply with standards specified herein.

2. The Contractor shall comply with all applicable Federal, State, and local codes.

3. In all cases where a device or part of the equipment is referred to in this Section in the singular (such as seismograph), it is intended that such references shall apply to as many such devices as are required to complete the installation.

B. Qualifications of Instrumentation Personnel

1. The Contractor shall retain the services of a qualified Geotechnical Instrumentation Engineer (GIE) who is a registered Professional Engineer in the State of New York. The GIE shall have at least four (4) years of experience in design, installation and monitoring for projects similar to this project.

2. The Contractor's instrumentation personnel shall include a Superintendent who will be in responsible charge on-site during the monitoring program. The Superintendent shall have at least four (4) years of direct field experience in installation and monitoring of the types of instrumentation to be used for this project, and shall have supervised instrumentation programs of similar magnitude in similar subsurface conditions. The position of the Superintendent may be filled by the GIE.

3. The Contractor's instrumentation data collection personnel shall have acceptable direct field experience and/or acceptable on-the-job training and supervision in collecting data from the types of instrumentation to be used for this project.

4. Any field surveys performed as part of the Monitoring and Instrumentation Program shall be performed by a Land Surveyor registered in the State of New York with a minimum of

three (3) years of experience in deformation measurements of the types and accuracy specified in the program. The field survey party chief shall have a minimum of one (1) year of experience in deformation measurements of the types and accuracy specified in the program.

C. Qualifications of Manufacturers

1. Products used in the Work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein.

2. The Contractor shall submit the following information pertaining to the manufacturer:

a. Complete literature, performance and technical data describing the proposed equipment and listing of items made by the manufacturer;

b. Location of closest service office from which this equipment shall be serviced; and

c. Location of closest parts inventory from item installation.

3. Pre-Construction Condition Survey.

1.7 CONTRACTOR'S RESPONSIBILITY FOR PROTECTING BUILDINGS, STRUCTURES AND ROADWAYS

A. The Contractor shall be solely responsible for maintaining, at all times, the safety, stability and integrity of every building, structure and roadway, regardless of location, that is affected by its Work. The Contractor shall be responsible for any damage due to the Work and for any corrective action or repairs needed to restore any damaged building, structure or roadway to its condition prior to the start of the Work.

B. The Contractor shall take all necessary precautions for the protection of personnel and perform the Work in a manner to prevent settlement of, or damage to, adjacent buildings, structures, roadways, sidewalks, walls, utilities, ducts, sewers and all other structures on the properties contiguous to the Site.

C. For preparing the Monitoring and Instrumentation Program, the documents to be reviewed by the Contractor shall include, but not be limited to, the records of adjacent construction and of existing utilities and their connections.

D. The Contractor shall protect as required all public and private properties adjacent to the Site. The Contractor shall at its own expense make repairs to damaged property necessitated by reasons of, or occurring in the course of, its operations, to the complete satisfaction of the Responsible Parties, the Engineer, and the property owner of the damaged property.

E. The Contractor shall not proceed with the Work until unsatisfactory conditions in the judgment of the Engineer have been corrected in a manner acceptable to the Engineer.

F. The Contractor shall be responsible for providing shoring and bracing as may be needed for prevention of movement and to protect affected structures.

1.8 SYSTEM COMPONENTS

A. Deformation Monitoring Points (DMPs)

1. The Contractor shall install DMPs to monitor vertical and horizontal deformations of existing buildings and other structures during construction.

2. Vertical movements that can occur at each DMP shall be detected to a minimum accuracy of ±0.01 feet (ft).

3. Fixed reference points not subject to movement due to the work activities shall be established. The reference points shall be maintained and protected during the project duration. The reference points may be used to re-establish the monitoring points, if needed.

4. The Monitoring and Instrumentation Program shall have a sufficient number of DMPs for each building and structure to assess the full impact of the construction activities on the building or structure.

5. The Contractor shall protect all DMPs from its construction operations and from vandalism. In case of damage or disturbance, the Contractor shall re-establish and restore the points at no additional cost to the Responsible Parties.

B. Vibration Seismographs

1. The Contractor shall measure vibrations at all buildings and structures within 100 feet of the active excavation and related construction work.

2. The Contractor shall obtain baseline vibration monitoring prior to the start of any construction operations. This work shall be performed in order to determine the magnitude of vibrations from normal street traffic as well as trucks and construction equipment so as not to affect the interpretation of vibration readings during the required monitoring periods.

C. Settlement Monitoring Points (SMPs)

1. The Contractor shall install SMPs to monitor vertical movement of the ground surface. SMPs shall consist of PK-nails, etch marks or approved equal, installed in concrete sidewalks, curbs or on concrete or asphalt roadways. These points shall be monitored for vertical movement as indicated on the Instrumentation and Monitoring Program and the Construction Drawings.

D. Utility Settlement Points

1. Utilities requiring settlement monitoring shall be outfitted with PVC sleeves such that vertical movement at the top of the sewer or utility can be directly measured by manual survey methods.

1.9 SUBMITTALS

A. General

1. The Contractor shall submit the following to the Engineer for review and approval, in accordance with Section 01 33 00 – Submittal Procedures.

a. Prior to start of Work, the proposed format for the pre-construction and post-construction survey reports.

b. Prior to start of Work, the pre-construction survey reports of all buildings and other structures within the zone of influence of the construction.

c. Detailed Monitoring and Instrumentation Program based on the Contractor's assessment of conditions of existing buildings and other structures, as specified herein. Submittal shall be signed and sealed by a Professional Engineer registered in the State of New York. The Monitoring and Instrumentation Program shall include, but not be limited to, working drawings along with the following information:

1) Proposed locations of DMPs, survey points, seismographs and other instruments;

2) Instrument details and methods of installation;

3) Monitoring frequencies and criteria;

4) Schedules for instrument installations, reporting, and instrument removals; and

5) Potential remedial action plans for each type of monitoring, if a trigger level as specified on the Construction Drawings or the Contractor's Program is reached.

d. Qualifications of monitoring personnel.

B. Product Data

1. The Contractor shall submit to the Engineer for approval the following product data:

a. For all instruments, manufacturer's specifications and other data required demonstrating compliance with the specific requirements; and

b. A complete materials list, showing all items to be furnished and installed under this Technical Specification.

C. Monthly Monitoring Data Reports

D. Final Copies – Working Drawings, As-Built Drawings

1. During the progress of the Work, the Contractor shall keep an up-to-date set of drawings showing field and working drawing modifications. Immediately upon completion of the Work, the Contractor shall provide Record Drawings showing the actual work performed under this Technical Specification. Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for complete Record Copies of the Work.

1.10 PRODUCT HANDLING

A. Transportation and Handling

1. The Contractor shall comply with the following transportation and handling requirements:

a. Pack, transport and handle all monitoring equipment in accordance with the manufacturer's instructions;

b. Arrange deliveries of monitoring equipment with proper sequencing and scheduling in accordance with the approved Project Schedule; and

c. Coordinate deliveries to avoid conflict with Work, conditions at the Site and availability of personnel and handling equipment.

B. Storage and Protection

1. The Contractor shall comply with the following storage and protection requirements:

a. Use all means necessary to protect monitoring equipment before, during and after installation and to protect installed work and materials of all other trades;

b. Store all monitoring equipment in strict accordance with the manufacturer's recommendation with all labels and seals intact and legible;

c. Arrange storage of monitoring equipment to permit access for inspection. Periodically inspect to assure monitoring equipment is undamaged and is properly maintained; and

d. Provide security for all equipment.

C. Replacement

1. If damage to monitoring equipment occurs during transportation, handling, storage, or use, or in the case of theft or vandalism, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Responsible Parties.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 EXAMINATION/PREPARATION

A. Pre-Construction and Post-Construction Condition Surveys

1. Prior to construction and after securing written permission from the affected property owners, the Contractor shall make examinations of the interior and exterior of buildings and structures within a distance of 100 feet of the proposed construction, specially designated structures, and in accordance with the provisions of the Administrative Code of the City of New York.

2. The Contractor shall make an examination prior to commencement of the Work and an examination after completion of the Work. The person or persons authorized by the Contractor to make said examinations of buildings must be approved by the Engineer.

3. The Contractor shall prepare and submit to the Engineer the condition survey report for each building and structure. The report shall describe in detail the condition of the building or structure and shall document all pre-existing conditions.

4. The Contractor shall take such digital photographs and/or digital video recordings as may be necessary to document the condition of the exterior surfaces and grounds of each building and structure examined in addition to any special or unique features or construction methods. The Contractor shall furnish the Engineer with one copy of each photograph, 8 inches by 10 inches in size, and the associated digital files on CD media, or a copy of the digital video recording. The digital video recording shall be provided on CD or DVD media.

5. The minimum scope of examination of buildings required, except as otherwise provided, include all sub-street levels and all levels from street to and including 5th floor, thence every 5th floor to floor below roof and set back floors, floors of setbacks, roofs and all structures above or on roofs. Also to be included are all corridors on these levels, and stairs, landings and their enclosures, continuous from bottom landings to top landings, inclusive, and all exterior surfaces and facades.

a. Examination of the interior portions of buildings shall focus on those rooms or areas which are in closest proximity to the construction work.

b. During the pre-construction condition survey, the Contractor shall install crack gauges at observed existing cracks on the structures for the purpose of continued monitoring during construction.

6. The Contractor shall not enter upon such adjacent private property for the purpose of building or structure examinations without prior approval by the property owner.

7. The Contractor shall accompany a representative of the property owner, if any, during any re-examination of the property during the course of construction to record conditions differences. Color photographs of conditions shall be taken. If requested, submit duplicate photographs to the Engineer.

8. The Contractor shall submit a written description to the Engineer of any measure taken to correct any damage that may have resulted from performance of Work.

3.2 INSPECTION

A. The Contractor shall examine the areas and conditions under which the monitoring work of this Section will be installed and correct conditions detrimental to proper and timely completion of the Work. The Contractor shall not proceed until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General

1. The Contractor's instrumentation personnel shall install instruments, following the guidelines included in the manufacturers' instruction manuals, and as detailed in the approved Monitoring and Instrumentation Program.

2. The Contractor shall inform the Engineer at least 48 hours prior to installing each instrument.

3. Exact locations of instrument installations shall be determined in the field with the approval of the Engineer, to minimize interference to other construction work.

4. As each instrument is installed, an installation record sheet shall be prepared. The following items shall be included as appropriate to the instrument:

   a. Project name;

   b. Contract name and number;

   c. Instrument type and number, including readout unit;

   d. Planned location and elevation;

   e. As-built location and elevation;

   f. Personnel responsible for installation;

   g. Date and time of start and completion;

   h. Results of post-installation acceptance checks;

   i. Initial readings; and

   j. A space on record sheet for notes, including problems encountered, delays, unusual features of the installation, and details of any events that may have a bearing on instrument behavior.

3.4 FREQUENCY OF MONITORING AND DATA PRESENTATION

A. Frequency of Monitoring

1. General

a. Initial readings shall be obtained from all instruments immediately after installation and a sufficient number of times following installation but before construction begins in order to verify that the instrument readings have stabilized and initial (ambient) conditions are established. At minimum, initial baseline readings shall be taken as indicated on the Construction Drawings.

b. During the course of regular monitoring, the Contractor shall maintain all readout equipment and probes in good working condition, and shall provide maintenance and calibration as required.

c. The minimum frequency of monitoring described in the Construction Drawings may be subject to adjustment in accordance with field behavior, or as requested by the Engineer.

d. The frequency and extent of monitoring are subject to change in accordance with the threshold and limiting levels described in the Construction Drawings or as established in the Monitoring and Instrumentation Program.

2. Data Presentation and Reporting

a. The Contractor shall make its own interpretations of the data from the monitoring program.

b. The Contractor shall program, set up, manage and maintain a project website upon which the monitoring data shall be made available to the Responsible Parties, the Engineer, and authorized third parties. The website shall be available from any internet ready computer or mobile device and shall allow for viewing and printing plotted or tabulated data for the entire duration of the Work. The Contractor's instrumentation personnel and surveyors shall reduce, process, tabulate, and report data obtained from the instrumentation and post it on the website on a daily basis.

c. In addition to the website, the Contractor shall prepare monthly written Monitoring Reports. The reports shall include reduced data tabulations, as appropriate to each instrument or measurement. All tabulated data sheets shall be updated to include cumulative results and shall include the following minimum information:

1) Instrument identification number and/or location of measurement;

2) Date and time for each reading;

3) Description of nearest construction activity;

4) Weather conditions at time of measurement;

5) Approximate depth and elevation of nearest excavation; and

6) Identification of each instrument whose measurement exceeds the Threshold or Limiting Criteria specified in Part 3.5 of this Section.

3.5 MONITORING THRESHOLD AND LIMITING CRITERIA

A. General

1. Minimum Threshold and Limiting Criteria have been established for all instruments as an initial basis for minimizing disturbance or damage to adjacent structures and facilities due to construction activities. These criteria and the general actions associated with them are provided in the Construction Drawings. The Contractor shall verify the adequacy of this criteria during preparation of the detailed Monitoring and Instrumentation Program, based on its own assessment of the conditions of existing adjacent structures.
2. Costs of all measures taken by the Contractor to prevent the exceedance of any criteria or the implementation of any action plan, should an exceedance occur, shall be included in the Contractor's bid and shall be performed at no additional cost to the Responsible Parties.
3. The Contractor shall have on the Site all materials and equipment needed to implement the preapproved action plans.

3.6 COMPLETION

A. Removal of Instrumentation

1. Upon completion of the Work, and as directed by the Engineer, the Contractor shall remove and dispose of all instruments and devices from the Site. Any damage to existing structures from removal of instrumentation devices shall be repaired by the Contractor to the satisfaction of the Responsible Parties at no additional cost to the Responsible Parties.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 10 00

SITE PREPARATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section details Site preparations to be conducted before the Work begins.

2. Provide all labor, materials, equipment, and incidentals required to perform clearing as required to perform the Work. Remove from the Site and dispose of trees, shrubs, stumps, roots, brush, logs, vegetation, topsoil, rubbish, and other objectionable material.

3. Pay all fees associated with transporting and disposing of debris resulting from clearing, unless otherwise paid by the Responsible Parties.

4. Limits of Clearing and Grubbing Work: Clear and grub only as necessary to facilitate installing temporary facilities as well as performing material removal activities.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 41 00 – Regulatory Requirements

C. Section 01 51 00 – Temporary Utilities

D. Section 01 57 13 – Temporary Erosion and Sediment Control

E. Section 01 57 19 – Temporary Environmental Control

F. Section 01 71 23.16 – Construction Surveying

G. Section 02 51 00 – Decontamination

H. Section 02 51 19 – Excavated Material and Waste Management

I. Section 31 23 16 – Excavation

J. Section 44 08 40 – Water Treatment System Requirements

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. Rules of the City of New York (RCNY). “Title 34: Department of Transportation.” http://rules.cityofnewyork.us/codified-rules?agency=DOT.

2. New York City Department of Transportation (NYCDOT) Street Works Manual. http://streetworksmanual.nyc.

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures:

1. A Site Preparation Work Plan detailing the following:

   a. Provisions of 24-hour Site security, including maintenance of Site gate access control (i.e., staffing guard booths) throughout the Work. Provide a schedule with proposed staffing for the guard booths needed to maintain security at the Site.

   b. Plans for installation, maintenance, and inspection of temporary fencing, erosion and sediment controls, and environmental controls prior to the start of earthwork, stockpiling, and equipment installation activities.

   c. Plans for preparing the Staging Site to facilitate road construction, storage of supplies and equipment, and installation of the Water Treatment System (Section 44 08 40 – Water Treatment System Requirements). Any grading performed shall promote positive drainage to mitigate ponded water.

   d. A proposed plan for relocation of storage containers and Site trailers, as needed, to facilitate installation of the Contractor's equipment and supplies.

   e. A proposed plan for relocating metal stairs associated with Block 453, Lot 1 and the drains associated with Block 453, Lot 21.

   f. If the Contractor elects the option to construct a separate decontamination pad, as described in Section 02 51 00 – Decontamination, the Contractor shall submit the design to the Engineer for review and approval.

   g. Proposed methods for controlling traffic. The Engineer will review the Traffic Plan and coordinate with applicable regulatory agencies prior to approval. The traffic control plan shall show and describe the following:

      1) A proposed plan for closing Carroll Street (if needed) in accordance with the requirements of this Section and Section 01 41 00 – Regulatory Requirements, including a schedule for obtaining street closure permits;

      2) Vehicular traffic routing along local streets;

      3) Any traffic blockage anticipated to be caused by the Work under this Contract;

      4) A trucking plan for delivery of materials and removal of debris, soil/sediment, and wash water if the plan differs from the Construction Drawings; and

      5) A construction parking plan for areas at the Site.

   h. The proposed Site layout showing the proposed locations and approximate dimensions of the following Staging Site facilities:

      1) Parking areas;

      2) Construction fencing;

      3) Drainage improvement areas;

      4) Personnel trailers/administrative areas;

      5) Secondary containment structure placement areas;

      6) Material laydown and storage areas;

7) Equipment staging and storage areas;

8) Decontamination facilities;

9) Roadways;

10) Barge tie-up areas;

11) Facilities for material and crew transfer;

12) Waste management/sanitary facilities; and

13) Other temporary facilities proposed for installation at Staging Site.

2. Site surveys to be conducted in accordance with Section 01 71 23.16 – Construction Surveying and consisting of the following:

   a. Initial survey to: (i) verify existing topographic conditions for areas in which grading or earthwork activities shall occur; (ii) verify the location of utilities planned to be used by the Contractor; and (iii) identify or confirm the location of utilities for areas where drilling and excavation activities are planned.

   b. Final or as-built surveys for the following: (i) stockpiles; (ii) new, modified, or relocated utilities; (iii) new asphalt or concrete pads; (iv) treatment facilities; (v) new fencing and gates; and (vi) a revised topographic conditions map for areas where grading or earthwork activities occurred.

3. Photographic surveys documenting the conditions of the existing bulkheads along the Staging Site (including the area available for scow/barge anchoring) shall be performed at low tide. These surveys will create a visual log of the entire length of bulkhead. One photographic survey, referred to as the Pre-Construction Staging Site Bulkhead Survey, shall be completed prior to the start of construction activities. One photographic survey, referred to as the Post-Construction Staging Site Bulkhead Survey, shall be completed at the end of construction activities.

PART 2: PRODUCTS

2.1 TEMPORARY FENCING

A. Temporary fencing, where used, will consist of 6-foot high chain-link fence equipped with warning signs.

PART 3: EXECUTION

3.1 GENERAL

A. Verify existing conditions as shown on the Construction Drawings prior to beginning the Work in this Section.

B. Obtain, pay costs associated with, and comply with applicable permits, if any, required for clearing Work.

C. Perform Site staging work within the Limits of Work presented on the Construction Drawings.

D. Maintain Site security and gate access in accordance with the Site Preparation Work Plan for the duration of the Work.

E. Maintain Site cleanliness in accordance with the Contract Documents.

F. Provide temporary utilities for the Work in accordance with Section 01 51 00 – Temporary Utilities.

G. Install, maintain, and inspect erosion and sediment controls and environmental controls prior to beginning the Work in accordance with Section 01 57 13 – Temporary Erosion and Sediment Control and Section 01 57 19 – Temporary Environmental Control.

H. Install temporary fencing around the Work Limit, including the Site and the Staging Site temporary support/staging area, and maintain and inspect such temporary fencing for the duration of the Work.

I. Utilize water application methods to control on-site dust as described in Section 01 57 19 – Temporary Environmental Control and Section 31 23 16 – Excavation.

J. Ensure that all vehicles hauling sediment or debris are decontaminated prior to leaving the Site, in accordance with Section 02 51 00 – Decontamination.

K. Coordinate the relocation of storage containers with the Engineer, as needed, to facilitate installation of the Contractor's equipment.

L. Decommission existing stickup wells within the footprint of the available work area in accordance with New York State Department of Environmental Conservation (NYSDEC) Policy CP-43: Groundwater Monitoring Well Decommissioning Policy. Prior to decommissioning, the Contractor may use MW-6P (or other monitoring wells, if desired) to collect additional groundwater samples for assessment of Site water quality parameters.

M. Protect against unknown utilities during drilling and excavation activities.

N. Complete initial, final, as-built, and measurement and payment surveys in accordance with Section 01 71 23.16 – Construction Surveying.

O. Complete Pre-Construction and Post Construction Staging Site Bulkhead Surveys.

3.2 TRAFFIC CONTROL

A. The Contractor shall retain the responsibility for traffic operations. The Contractor shall cooperate with the Engineer so that traffic flow is minimized by the execution of the Work under this Contract.

B. The Contractor shall understand the special requirement of maintaining the parcel identified as the staging area in full operation concurrent with the construction activities, and shall provide continuous and safe access by the Engineer to all areas of the Site not specifically designated for Work by the Contractor.

C. Other than as shown on the approved traffic control plans, at no time shall the Contractor's operations interfere with the traffic flow of occupied areas of the Staging Site or neighborhood.

D. If the gate at the entrance of the parcel identified for the Stating Site is insufficient for protection of the Work, the Contractor shall install temporary fencing and a gate to control traffic and Site access. The Contractor shall comply with the regulatory requirements in Section 01 41 00 – Regulatory Requirements.

E. Upon completion of the Work, temporary traffic control items furnished by the Contractor shall remain the Contractor's property and shall be removed from the Site by the Contractor. Existing traffic control features furnished by the Responsible Parties, such as existing fencing and gates, shall remain (or be replaced if damaged).

3.3 CONSTRUCTION PARKING

A. Construction parking shall be limited to the following areas:

1. The Contractor's parking, laydown, and storage areas; and
2. Legal parking areas on nearby city streets.

B. Construction parking shall not be allowed in the following areas:

1. Adjacent city streets where parking is not allowed, such as bus loading zones, driveways, etc.; or
2. On-site in non-parking areas.

C. The Contractor shall be responsible for informing all workers of parking restrictions and removing any vehicles from areas designated as NO PARKING.

3.4 CLEARING

A. Remove all trees, shrubs, stumps, roots, brush, logs, rubbish, and debris within the construction work limits as required to perform the Work or as indicated in the Contract Documents. Trees, shrubs, and other dense vegetation shall be removed to ground surface.

B. Trees and shrubs intended to remain that have been damaged or require trimming shall be treated and repaired under the direction of a qualified arborist, or other professional with qualifications acceptable to Engineer. Trees and shrubs intended to remain that are damaged beyond repair or that are removed shall be replaced by the Contractor at no additional cost to the Responsible Parties.

3.5 DISPOSAL OF CLEARED MATERIALS

A. Properly transport and dispose of cleared and grubbed materials, as necessary at a facility approved by the Responsible Parties, in accordance with Laws and Regulations and Section 02 51 19 – Excavated Material and Waste Management.

B. Trees and shrubs shall be chipped or cut into manageable-sized pieces to support transport and disposition.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 23 16

EXCAVATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section presents details regarding the Contractor's excavation of the First Street Turning Basin.

1.2 RELATED SECTIONS

A. Section 01 32 00 – Construction Progress Documentation

B. Section 01 33 00 – Submittal Procedures

C. Section 01 41 00 – Regulatory Requirements

D. Section 01 52 13 – Temporary Field Offices and Structures

E. Section 01 57 13 – Temporary Erosion and Sediment Control

F. Section 01 57 19 – Temporary Environmental Controls

G. Section 01 71 23.16 – Construction Surveying

H. Section 02 51 00 – Decontamination

I. Section 02 51 19 – Excavated Material and Waste Management

J. Section 31 09 13 – Geotechnical Instrumentation and Monitoring

K. Section 31 10 00 – Site Preparation

L. Section 44 08 40 – Water Treatment System Requirements

1.3 REFERENCES

A. United States Army Corps of Engineers, Section 16.L: Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard-Mounted Cranes in the USACE Safety and Heath Requirements, 2014;

1.4 DEFINITIONS

A. Bed Leveling or Dragging – The use of a drag bar or similar apparatus to level the sediment surface.

B. Debris – Material separated from excavated material during the material separation process (as shown in the Construction Drawings and described in this Section) or any object (wood, concrete, tires, plastic, rocks, rubbish, etc.) greater than 6 inches that is not considered excavated material.

C. Excavated Material – Material removed from the Turning Basin, as shown in the Construction Drawings and described in this Section.

D. Excessive Excavation – Material removed beyond the allowable overage excavation (OE) will be considered excessive.

E. Grade or Required Depth – Depth of excavation the Contractor must achieve for approval of excavation completion.

F. Grizzly Bars – A deck of equally spaced bars placed on a collection container or hopper to separate debris from excavated material.

G. Overexcavation Allowance – Depth below grade that is not required to be removed, but for which the Contractor will be paid.

H. Overexcavation Volume – Volume between grade (required depth) and OE depth that is not required to be removed, but for which the Contractor will be paid if it is removed.

I. Phase I Excavation – Excavation of unsaturated soils. It is anticipated that unsaturated soils will be observed from the surface down to the approximate elevation of the Mean High Water level [i.e., approximately 1.96 feet (ft) North American Vertical Datum of 1988 (NAVD88)]; however, the transition between Phase I and Phase II shall be determined based on visual observation in the field.

J. Phase II Excavation – Excavation of saturated soils. It is anticipated that saturated soils (i.e., sediments) will be observed at the approximate elevation of the Mean High Water level (i.e., approximately 1.96 ft NAVD88); however, the transition between Phase I and Phase II shall be determined based on visual observation in the field.

K. Required Excavation Volume – Volume of material, excluding OE volume, that the Contractor must remove prior to acceptance of excavation completion.

L. Side Slopes – Slope of the cut or fill expressed as the ratio of horizontal distance to vertical distance.

M. Survey – All surveys of the excavation area shall be hydrographic surveys in accordance with the United States Army Corps of Engineers (USACE) Hydrographic Surveying Manual.

N. Sweeping – The movement of the excavator bucket along the Canal bottom with the intent to level the excavated surface.

1.5 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures.

1. An Excavation Work Plan

a. The Contractor shall demonstrate compliance with the requirements outlined in this Section, related Sections and Construction Drawings, and the Material Management Plan. Describe the sequencing, details, and means and methods of all excavation operations, including, but not limited to, the following information.

1) Mobilization:

a) Proposed means and methods for barge mobilization and deployment of other vessels, equipment and support equipment.

2) Equipment:

a) A list of excavation equipment to be used, including specifications, capacities, design of barges/excavation equipment, and details regarding their conformance with Section 16.L: Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard-Mounted Cranes in the USACE Safety and Heath Requirements (USACE 2014);

b) Size of scows to be used, ullage tables, and scow drafts when loaded;

c) Description of fuel storage areas and refueling procedures;

d) Details about global positioning systems (GPS) to be used;

e) Excavation visualization software to be used; and

f) Vendor information and/or detailed drawings of the environmental and conventional buckets to be used.

3) Scheduling:

a) Provide a schedule, including sequencing and durations, for the excavation Work.

b) Description of fuel storage areas and refueling procedures.

4) Proposed means and methods for the following:

a) Excavation in areas of shallow draft;

b) Best management practices to minimize the resuspension of sediments and control of odor;

c) Separating debris from excavated material;

d) Means and methods for excavating material adjacent to bulkheads and/or located in wall corrugations and offsets;

e) Sourcing, transport, staging, and placement of post-excavation backfill;

f) Offloading sorted debris and excavated material (if applicable) onto the asphalt pad at the Staging Site;

g) Removing and transporting decant water from barges to the Water Treatment System located at the Staging Site;

h) Monitoring, surveying, and reporting excavation progress to meet the grades shown on the Construction Drawings;

i) Protecting structures, utilities, and banks during excavation (e.g., the use of protective bumpers, areas intended for anchoring along with the location of sensitive structures, etc.);

j) Tying up and securing barges; and

k) Keeping the public clear of excavation operations.

5) Personnel:

a) Certifications and qualifications shall be provided for all crane and other equipment operators (i.e., boat captains, etc.), including years of experience; and

b) An organizational chart shall be provided that illustrates the project management team and chain of communication during excavation operations.

6) Daily Inspections:

a) Include inspection forms of all barges and scows including load limits; and

b) Procedures for inspecting major equipment (e.g. excavators, bucket/grapple/rake attachments, pumps, generators, piping), including inspection frequency and a proposed plan for addressing equipment malfunction.

2. Surveys (conducted by the Contractor)

a. Weekly progress surveys of the entire First Street Turning Basin, including the access channel, will be required for the duration of excavation. The following will be required for each survey:

1) A bathymetry map depicting 1-foot contours within the First Street Turning Basin;

2) A map with the excavation bucket tracks for the week overlaid 1-foot contours within the First Street Turning Basin;

3) Calculated weekly volume removed; and

4) Calculated cumulative project volume removed.

b. After-Excavation (AE) surveys will be performed by the Contractor after each phase of excavation and backfilling. AE surveys shall contain the following information:

1) Sorted minimum sounding data in XYZ format;

2) Sorted average sounding data in XYZ format;

3) A bathymetry map depicting 0.5-foot contours within the First Street Turning Basin with minimum soundings from each grid cell (soundings below grade shall be in one color, while soundings above grade shall be another);

4) A bathymetry map depicting 1-foot contours within the First Street Turning Basin overlaid with all bucket tracks for that phase;

5) Total excavation volume to grade calculation; and

6) OE volume calculation.

c. Probing results from along the pipe pile bulkhead supports.

3. Daily and Weekly Progress Reports.

a. Detailed requirements for daily and weekly submittals are provided in Section 01 32 00 – Construction Progress Documentation.

1.6 SITE CONDITIONS

A. Subsurface Information

1. The associated 100% Design Report indicates information available relative to subsurface conditions at the Site. Such information and data is not intended as a representation or warranty of continuity of conditions between soil borings or test pits, nor of surface water or groundwater levels at dates and times other than date and time when measured, nor that purpose of obtaining the information and data were appropriate for use by the Contractor.

The Responsible Parties and the Engineer will not be responsible for interpretations or conclusions drawn therefrom by the Contractor.

2. Soil borings and other exploratory operations may be made by the Contractor, at no additional cost to the Responsible Parties. Coordinate Contractor-performed test borings and other exploratory operations with the Responsible Parties and utility owners as appropriate. Perform such explorations without disrupting or otherwise adversely affecting operations of the Responsible Parties or utility owners. Comply with Laws and Regulations relative to required notifications.

B. Existing Structures

1. The associated 100% Design Report show or indicate certain existing structures and underground facilities adjacent to or within the limits of the Work. Such information was obtained from existing records and is not guaranteed to be correct or complete. The Contractor shall explore ahead of demolition, trenching, excavation, or other subsurface work to determine the exact location of all existing structures and underground facilities. Existing structures and underground facilities shall be supported and protected from damage by the Contractor. If existing structures and underground facilities are damaged, the Contractor must immediately repair and restore them, without additional cost to the Responsible Parties.

2. Movement or operation of construction equipment over underground facilities shall be at the Contractor's sole risk and only after the Contractor has prepared and submitted to the Engineer and utility owners (as applicable), and received acceptance therefrom, a plan describing the Contractor's analysis of the loads to be imparted and the Contractor's proposed measures to protect structures and underground facilities during the Work.

3. If needed, coordinate with utility owners for shut off of services in active piping and conduits, and for testing, shut off of services, and draining, purging, or de-energizing where specified or required of piping and conduits of unknown status. When required by the utility owner, the Responsible Parties will assist the Contractor with utility owner notifications.

4. Do not interrupt existing utilities serving facilities occupied and used by the Responsible Parties or others, except when such interruption is allowed in writing by the Engineer after acceptable temporary utility services are provided by the Contractor for the affected structure or property.

PART 2: PRODUCTS

2.1 EQUIPMENT

A. Furnish equipment necessary to perform excavation and any waste water (e.g., decant water, precipitation run-off) management operations in accordance with this Section, the Construction Drawings, and the approved Excavation Work Plan. The Contractor is responsible for cleaning and decontaminating equipment and vessels in accordance with Section 01 32 00 – Construction Progress Documentation. Equipment shall include the following.

1. Material Handler. Described in Section 02 51 19 – Excavated Material and Waste Management.

2. Excavation barge. The excavation barge shall be narrow enough to maneuver within the Canal (including the ability to pass all crossings/bridges). Additionally, the barge shall have

a shallow enough draft to not run aground within the Canal. The barge and excavator shall be equipped with real time kinematic (RTK) GPS and excavation visualization/tracking software (e.g. Hypack, TELEDYNE PDS Dredge, etc.).

3. Tugboats. Tugboats shall not draft more than 7 ft nor be longer than 60 ft to access the First Street Turning Basin and maneuver throughout the Canal. Tugboats shall be narrow enough to maneuver within the Canal.

4. Scows. Scows shall be narrow enough to be maneuverable within the First Street Turning Basin. All scows must have draft markings and an ullage table for load volumes. Split hull scows (i.e. dump scows) are not permitted.

5. Grizzly bars. The Contractor shall use grizzly bars with a maximum spacing of 6 inches to sort debris from excavated material. The use of vibrating grizzly bars is recommended based on results from prior First Street Turning Basin investigations.

6. Grapples and Rakes. Grapples shall be orange peel style or similar for handling of debris. Grapples and rakes shall be capable of manipulating a variety of debris types and sizes, as shown on the Construction Drawings.

7. Environmental Clamshell Bucket. The enclosed level-cut environmental bucket shall be sealed with venting to relieve pressure while lowering the bucket, but shall not allow water to drain following collection of material. The bucket shall be of sufficient capacity to efficiently remove the excavated material, as shown on the Construction Drawings.

8. Conventional Clamshell Bucket. The conventional clamshell bucket shall have a completely open top. The bucket shall be of sufficient capacity to efficiently remove the excavated material, as shown on the Construction Drawings.

PART 3: EXECUTION

3.1 GENERAL

A. Material movement and handling for Phase I and Phase II excavation activities.

B. Locate utilities within the First Street Turning Basin and any other areas where utilities may be encountered during the Work.

C. Verify existing conditions as shown on the Construction Drawings prior to beginning the Work in this Section.

D. Conduct the Work in accordance with the regulatory requirements outlined in Section 01 41 00 – Regulatory Requirements.

E. Remove, transport, and dispose of excavated materials and solid waste in accordance with Section 02 51 19 – Excavated Material and Waste Management.

F. Decontaminate equipment and barges/scows in accordance with Section 02 51 00 – Decontamination.

3.2 EQUIPMENT OPERATORS

A. All excavation and equipment operators (i.e. boat captains) shall have a minimum of 2 years of experience with the type of equipment they are to be operating.

3.3 EXCAVATION OPERATIONS

A. Excavation activities shall be completed according to the following sequence:

1. Conduct a pre-construction photographic survey;
2. Excavate unsaturated soils within the project limits as shown on the Construction Drawings (i.e., Phase I excavation);
3. Install temporary environmental controls as described in Sections 01 57 13 – Temporary Erosion and Sediment Control and 01 57 19 – Temporary Environmental Controls;
4. Excavate materials within the First Street Turning Basin as shown in the Construction Drawings;
5. Conduct Phase II Excavation within the First Street Turning Basin, in lifts, to the depths presented in the Construction Drawings; and
6. Excavate test pits along existing bulkheads and install bulkhead supports as shown in the Construction Drawings.

B. The Work should be performed in accordance with the Materials Management Plan and account for vessel traffic throughout the Canal, restrictions to navigation (e.g. bridges, tides), and long lead-time items such as permit approvals or disposal facility approvals/authorizations.

C. The Contractor shall perform Phase II Excavation to the extents and grades shown on the Construction Drawings and within the tolerances defined in this Section.

1. Excavation will be performed with an environmental bucket to the extent practical. If debris present in the Canal prevents the environmental bucket from fully closing or otherwise significantly interferes with operations, a conventional clamshell bucket may be used with the approval of the Engineer. The Engineer shall be provided with the basis, including a field demonstration, for recommending the use of a conventional clamshell bucket. Unless otherwise approved by the Engineer, the Contractor shall switch back to the environmental bucket when conditions improve. and allow successful operation of the environmental bucket.
2. Phase I Excavation: Phase I Excavation shall be completed based on visual observation of unsaturated soils.
3. Phase II Excavation: saturated soils shall be excavated in a series of lifts to the grades shown in the Construction Drawings.
    a. A first pass, with a lift no greater than 4 ft in depth, but not below the elevation shown on the Construction Drawings for the temporary brace installation, should be completed across the entire First Street Turning Basin to allow for stability monitoring during excavation, as outlined in Section 31 09 13 – Geotechnical Instrumentation and Monitoring. If bulkhead monitoring indicates the sidewall stability is acceptable, then the Contractor shall continue with additional passes to a maximum thickness of 4 ft (or to final grade, whichever is shallowest) across the First Street Turning Basin. This process shall continue until the design grade is achieved across the entire excavation area.
    b. If instability is observed during excavation, according to Section 31 09 13 – Geotechnical Instrumentation and Monitoring, or if any other problem is encountered, the Contractor shall be prepared to stop the Work at the direction of the Engineer. The

Engineer will work with the Contractor to determine additional or alternative shoring approaches as necessary.

c. The maximum vertical OE allowance for Phase II Excavation is 6 inches (0.5 ft), but not more than 3 ft below the centerline of the temporary and permanent bracing elevations shown on the Construction Drawings. Volume removed in these areas will be accounted for and paid under Phase II Excavation.

D. Excavation shall occur in an orderly and logical manner in accordance with this Section, the Construction Drawings, and the approved Excavation Work Plan. If unanticipated conditions are encountered, the Contractor shall immediately stop the Work and verbally notify the Engineer. Following resolution of the situation, the Contractor will provide written notification to the Engineer detailing the unanticipated conditions and resulting resolution.

E. Debris shall be separated from excavated material, transported to the Staging Site, and disposed in accordance with Section 02 51 19 – Excavated Material and Waste Management and the Construction Drawings.

1. The Contractor shall use grizzly bars to remove debris larger than 6 inches.

2. Cultural resources are to be preserved in accordance with this Section and as shown in the Construction Drawings.

3. Debris is to be washed on the barge at the Staging Site as follows.

a. All wash water shall be from a potable water source.

b. The Contractor shall wash debris to remove excavated material that can be practically removed from the debris surface using high pressure spray water. If the Engineer determines that excavated material that is practical to remove with high pressure spray water has not been removed, the Contractor shall perform additional washing at no additional cost to the Responsible Parties.

c. Removal of excavated material from paper, cardboard and decaying wood is not considered to be practical. Additionally, the removal of adhered excavated material that would require the use of a putty knife or similar scraping tool is not considered practical. The removal of excavated material from voids and cavities in the debris that requires special handling of debris will not be required.

d. The Contractor shall apply sufficient effort to demonstrate that all exposed surfaces on the debris are pressure washed.

F. Barge dewatering and transport of wash water shall be conducted as follows.

1. Barges will contain water that must be decanted prior to excavated material processing. The Contractor shall provide an adequate period of mooring to allow solids to settle in the barge. After the initial barge settling period, the Contractor shall transfer decant water to the Water Treatment System described in Section 44 08 40 – Water Treatment System Requirements.

2. Wash water from debris washing on the barge shall be captured and transported to the EWTS.

G. Discharge of excavated material, fuel, oil, or other materials into the Canal is prohibited. The Contractor shall notify the Engineer immediately if accidental discharge occurs and shall take actions to mitigate the spill/release. Spills will be prevented and managed in accordance with the Materials Management Plan.

H. Maintain Site order and cleanliness in accordance with the Materials Management Plan.

I. For safety of the deckhands or other crew walking down the scows, the walkways shall be cleaned of excavated material in the following fashion:

1. The walkways shall first be shoveled clear of excavated material and the excavated material placed in the scow;

2. The remaining residual excavated material can be washed with water from the Canal, so long as an excessive amount of water is not used; and

3. This wash water will not need to be captured for treatment.

J. The Contractor shall protect and maintain the stability of bulkheads and other structures adjacent to the First Street Turning Basin that could be impacted by excavated material removal. The Contractor shall repair damages to structures resulting from excavation or bulkhead support operations at no cost to the Responsible Parties.

K. For all phases of excavation:

1. The Contractor is required to excavate to the grade shown in the Construction Drawings;

2. The Contractor will be paid for limited vertical OE as noted in this Section and the Construction Drawings. Horizontal excavation extends shall conform to the neat lines indicated in the Construction Drawings, and no OE will be paid for horizontal OE;

3. Any material that is classified as excessive excavation will be removed, processed, and disposed at the Contractor's expense;

4. Any post-excavation backfill as a result of excessive excavation will be sourced and placed at the Contractor's expense; and

5. Any damage to adjacent structures or bulkheads due to excessive excavation shall be repaired at the cost of the Contractor as approved by the Engineer.

3.4 ENVIRONMENTAL PROTECTION

A. The Contractor shall control excavated material and floatables in accordance with the Materials Management Plan and Section 02 51 19 – Excavated Material and Waste Management.

B. The Work will be conducted in compliance with water quality requirements described in Section 44 08 40 – Water Treatment System Requirements.

C. The Work will be conducted in compliance with the Community Air Monitoring Plan, which will be provided upon request.

D. Implement environmental controls for spill prevention, dust, noise, and air in accordance with Section 01 57 19 – Temporary Environmental Controls.

3.5 PROTECTION

A. Protect bulkheads against damage. The Contractor shall not use bulkheads to reposition barges or other vessels. The Contractor shall repair or replace bulkheads damaged during the Work at no cost to the Responsible Parties.

B. The only bulkhead onto which scows may be moored is the bulkhead west of the First Street Turning Basin. Bulkhead protection (e.g., bumpers) shall be installed prior to tying of scows. Scows may not be moored to any other bulkhead or dock. No scows may be tied to the dock at the Staging Site.

C. Protect existing utility services and distribution systems from damage or displacement.

D. Protect existing improvements against damage, and repair or replace items damaged during the Work.

3.6 SURVEYS AND VERIFICATION OF MATERIAL REMOVAL

A. Hydrographic Surveys shall be conducted by the Contractor in accordance with Section 01 71 23.16 – Construction Surveying.

1. Progress Surveys. At a minimum, the Contractor shall conduct weekly hydrographic surveys to maintain a record of the depth and extent of excavation throughout the course of the Work.

2. After Excavation (AE) Surveys. The Contractor shall conduct hydrographic surveys after the following phases of excavation and backfilling to verify that soil and excavated material has been removed to the grades shown on the Construction Drawings:

a. Phase I Excavation;

b. Phase II Excavation;

c. Following trench excavation for the permanent bracing; and

d. Following basin cap placement.

3. The Contractor shall perform the surveys at the completion of each phase of excavation and provide submittals to the Engineer indicating that:

a. Required grades have been met. The Contractor shall re-excavate any areas more than 6 inches above the required grade; and

b. The toe of all slopes show clearance to final grade.

4. Since a hydrographic survey may not be accurate at the interlock locations between the pipe piles, material removal shall be verified in these areas by probing as follows:

a. At every fifth interlock between the pipe piles and at each interior corner of the walls, the Contractor shall probe with a leadline within the cavity to determine the AE depth. A weight with a minimum diameter of eight inches and weighing at least 8 pounds shall be used for probing. If the AE depth meets the design depth presented in the Construction Drawings, that section of pipe pile wall is considered to have passed clearance. If probing indicates the depth is insufficient, the Contractor shall continue to excavate in that area until design depth is achieved.

B. Hydrographic Surveys by Others

1. Before Excavation

a. Before excavation begins, the Engineer shall have a Before Excavation (BE) survey performed. The survey will meet the requirements of Section 01 71 23.16 – Construction Surveying and the results of the survey will be provided to the Contractor for their use. The BE survey shall provide the baseline for volume calculations for measurement for payment.

2. After Excavation

a. Following the receipt of each of the Contractor's AE surveys, a hydrographic survey will be performed by others. Following approval of the Contractor's survey submittals

by the Engineer, the hydrographic survey will be scheduled for the next business day. The Contractor shall relocate their equipment at no additional cost to the Responsible Parties to allow access for the hydrographic survey. Upon completion of the hydrographic survey, the Contractor shall proceed with the next phase of excavation or backfilling.

3.7 WORK VESSEL COMMUNICATIONS

A. For all marine work, the Contractor shall provide a means of communication between personnel working between vessels and on land [e.g., two-way marine Very High Frequency (VHF) radio].

B. At a minimum, every vessel operator and the excavator operator shall have a working VHF radio at all times.

C. The Contractor shall determine a working channel for the project and inform all Site personnel.

D. In addition to the designated project channel, the Contractor shall monitor VHF channels 14 (New York Traffic) and 16 (United States Coast Guard).

3.8 CANAL AND SITE ACCESS

A. For all marine work, the Contractor must coordinate with the Coast Guard and any local marine traffic.

B. The Contractor shall minimize their impact on vessel traffic within the Canal.

C. The Contractor is responsible for coordinating all required bridge openings through the New York City Department of Transportation (NYCDOT) in one of the following three ways:

1. NYCDOT Bridge Operator on marine radio channel 13;
2. NYCDOT Bridge Operations Office at 212-839-3740; or
3. NYCDOT Communications Center at 718-433-3340.

D. The Contractor shall be responsible for Site security and shall maintain Site gate access control throughout the Work, as specified in Section 01 52 13 – Temporary Field Offices and Structures. Details regarding vehicular access and parking are also discussed in Section 31 10 00 – Site Preparation.

3.9 CULTURAL RESOURCES MONITORING

A. Cultural resources refer to archaeological features, artifacts, and historic structures (bridges, bulkheads, buildings, etc.) located within the Canal that are potentially eligible for the National Register of Historic Places (NRHP). In general, properties (including objects and vessels) that are in excess of 50 years old are potentially eligible for the NRHP.

B. The Contractor shall be responsible for reviewing the requirements listed in the Archeological Monitoring Report provided as Appendix L of the 100% Design Report.

C. Cultural resources will be evaluated during excavation (all phases) and the debris management process.

1. All excavation and debris sorting activities must conform to the requirements of the Cultural Resource Monitoring Plan.
2. In accordance with the Cultural Resource Monitoring Plan, training will be provided on-site by the monitoring archaeologist for the Contractor's staff working on debris and excavated material sorting and management, prior to the start of the Work. This training

will help non-archaeological staff identify potential cultural resources and understand the protocol in the event any are encountered during excavation and debris sorting activities. Training will consist of approximately 60 minutes of discussion and PowerPoint presentation.

D. Should the monitoring archaeologist note features of archaeological potential during excavation and debris sorting activities, he/she may, as per the agreed monitoring methodology, request the operator to stop excavation as necessary. Further actions, such as avoiding the area of the potential resource or altering the way in which the machine is operated, may be specified by the Engineer.

1. If unknown or unanticipated cultural resources are encountered, additional investigation may be needed. This may be accomplished by removing relevant debris for evaluation, if the deposit is small enough.

2. For some areas where the Work is being conducted and known or suspected cultural resources are located nearby, an on-site archaeologist (provided by the Engineer) may be present on the barge for visual inspection of the debris during removal activities. The areas of known or suspected cultural resources are highlighted on the Construction Drawings and on the maps included in the Cultural Resource Monitoring Plan.

3. Objects classified as potential cultural resources (i.e. potentially historic or pre-historic artifacts) by the on-site archaeologist shall be stored at the Staging Site in coordination with the Engineer.

3.10 EXCAVATED MATERIAL TRANSPORT, TREATMENT, AND MANAGEMENT

A. The Contractor shall transport, treat and manage excavated material in accordance with the Materials Management Plan.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 53 01

LATERAL BRACING FOR EXCAVATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

.

1. Install all bracing for lateral support as indicated on the Construction Drawings and in accordance with the requirements of this Section.
2. This Section describes the requirements for the Contractor's installation of temporary bracing supports for excavation.
3. The Work includes but is not limited to:
    a. Furnishing and installing structural steel support members including wales, struts, bearing plates, wedges and shim plates for lateral bracing of the pipe pile walls;
    b. Removal of lateral support steel members in accordance with the construction sequence shown on the Construction Drawings, after the Engineer's acceptance of permanent construction; and
    c. Revisions to the brace installation methods if lateral or vertical wall movements exceed 1 inch in any direction.

1.2 RELATED SECTION

A. Section 09 96 56 – Epoxy Coatings

B. Section 31 09 13 – Geotechnical Instrumentation and Monitoring

C. Section 31 23 16 – Excavation

1.3 REFERENCES

A. The Work and materials shall be in accordance with the latest current editions and revisions of the applicable standards, specifications, and codes of:

1. American Society for Testing and Materials (ASTM)
    a. ASTM A36, Standard Specification for Carbon Structural Steel
    b. ASTM A252, Standard Specification for Carbon Seamless Pipe
    c. ASTM A325, Standard Specification for Structural Bolts, Steel, Heat 120/105 KSI Minimum Tensile Strength Treated, 120/1 05 KSl Minimum Tensile Strength
    d. ASTM A572, Standard Specification for High Strength Low Alloy Columbium Vanadium Structural Steel
    e. ASTM A992, Standard Specification for Steel for Structural Shapes for Use in Building Framing
2. American Institute of Steel Construction (AISC)

3. Manual of Steel Construction American Welding Society (AWS)

    a. Structural Welding Code, Standard D1.l.

1.4 CONSTRUCTION REQUIREMENTS

A. The installation and maintenance of the steel bracing system is the responsibility of the Contractor. The bracing design is based on the locations of supports and construction sequence shown on Construction Drawings.

B. The criteria for bracing members and steel braces are shown on the Construction Drawings. The Contractor shall be responsible for making any revisions to the designs and detailing that may be required to take into account field conditions different than those indicated on the Construction Drawings. Structural design revisions shall be in accordance with AISC's Manual of Steel Construction. All revisions shall be submitted to the Engineer for approval prior to installation.

C. The bracing installation shall minimize the movements of the pipe pile walls during excavation. If distress or observed deficiencies of individual members or connections are found during the installation, the Contractor shall undertake such remedial measures as may be required to prevent excessive movement of the pipe pile walls.

1.5 SUBMITTALS

A. Submit the following to the Engineer for approval prior to beginning work and when any change in materials or source of supply is proposed:

1. Certificates for Materials:

    a. Certification(s) for the steel furnished for the support systems.

2. Materials and Methods:

    a. Methods of resolving difficulties arising from misalignment of pipe pile walls.

3. Shop Drawings:

    a. Plans and details of the bracing members including connection details to which the support system will be installed.

B. As-Built Data: Submit the following as-built information within two 2 days of completion.

1. Any revisions to methods of assembly of proposed bracing members.

1.6 QUALITY ASSURANCE

A. Provide full time on-site qualified supervision to verify that the standards specified herein are attained.

B. All bracing installations shall be performed in the presence of the Engineer's Special Inspection Engineer, who shall be allowed unrestricted access during the Work.

C. The Contractor shall be responsible for making prompt evaluations and taking immediate steps to correct any deficiencies in the capacities of individual bracing members or other parts of the support system.

PART 2: MATERIALS

2.1 STEEL

A. Structural Steel shall be new and shall meet the requirements of ASTM A572 Grade 50 or A992 Grade 50, as indicated on the Construction Drawings, or approved equal.

B. Bracing member sizes shall be as shown on the Construction Drawings.

C. Connections shall meet the requirements of AISC Manual of Steel Construction and the Construction Drawings, and shall be approved by the Engineer.

D. Pipe struts shall conform to the requirements of ASTM A252, Grade 3, with a minimum yield strength of 45 kilopound per square inch (ksi).

E. High Strength Bolts, if used, shall conform to the requirements of ASTM A325.

F. Welding shall conform to the requirements of AWS D1.1 and shall be performed using E70 electrodes.

G. Shims and wedges shall be forged or machine steel sections suited for the Work.

2.2 DRYPACK/SAND-CEMENT (NOT USED)

PART 3: EXECUTION

3.1 GENERAL REQUIREMENTS

A. Inspect and check capacity of structural steel bracing members during the Work and make remedial repairs as necessary to restore the full capacity of any member if damaged or altered during delivery or construction. Primary bracing members of the bracing support system shall not be spliced except as indicated on the Construction Drawings.

B. The maximum excavation level below the centerlines of braces shall be limited to 2 feet prior to installation of the brace system.

C. During the course of steel bracing installation, provide supplemental brackets, posts, lateral bracing or steel cables to temporarily support the bracing members as required.

3.2 BRACING INSTALLATION

A. Provide temporary supports and connections as required by Construction Drawings.

B. Install wales with support brackets for connection to pipe pile walls as required or shown on the Construction Drawings.

C. Install web stiffeners, plates or angles as needed to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Provide the fabrication of extra members or connections as necessary to provide tight contact with each primary support member and with each surface being supported.

D. Perform preloading of the struts to the specified loads prior to proceeding with excavation:

1. Preload bracing members by wedging as indicated on the Construction Drawings;

2. Use procedures that provide uniform loading of the bracing member without appreciable eccentricities, overstressing or distortions of members of the support system;

3. Make provisions for permanently fixing each end of the brace member using steel plates or shims welded into place; and

4. Provide pre-loading by driving steel tapered wedges at locations indicated on the Construction Drawings.

E. Excavate no more than 2 feet below the point of support about to be placed. Local trenching will be permitted to facilitate bracing installation, as approved by the Engineer. Install support members and preload immediately after their installation and prior to continuing excavation.

F. Follow the construction sequences shown on the Construction Drawings for installation and removal of struts and wales. The installation of the permanent bracing and tremie concrete encasement must be completed and approved by the Engineer prior to bracing removal as indicated by the construction sequences.

3.3 BRACING REMOVAL

A. Remove bracing members in accordance with the construction sequences specified on the Construction Drawings after the permanent bracing is capable of supporting the design lateral loads, subject to the approval of the Engineer;

B. After removal of steel bracing, touch-up the pipe pile coating as required to restore its integrity and as required by Section 09 96 56 – Epoxy Coatings; and

C. Remove all material and debris from the excavation support systems from the Site immediately after the Engineer's approval of the bracing removal.

3.4 SEALING

A. Obtain the Engineer's approval before disengaging bracing members;

B. Remove bracing members without damaging the pipe piles or other portions of new construction or existing adjacent structures;

C. Cut and remove each bracing member individually;

D. Clean wall and bearing plate surfaces using high pressure water jets and wire brushes; and

E. Post grout any leaks or seepage to seal the pipe wall walls and maintain a watertight condition.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 63 34

DRILLED STEEL PIPE PILES

PART 1: GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish and install concrete filled steel pipe piling as indicated on the Construction Drawings and in the Technical Specifications.

1.2 RELATED SECTIONS

A. Section 02 51 19 – Excavated Material and Waste Management

B. Section 03 37 26 – Underwater Placed Concrete

C. Section 05 12 34 – Structural Steel

D. Section 09 96 56 – Epoxy Coatings

E. Section 31 09 13 – Geotechnical Instrumentation and Monitoring

F. Section 31 23 16 – Excavation

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Society for Testing and Materials (ASTM) A252, Welded and Seamless Steel Pipe Piles.

2. American National Standards Institute/American Welding Society (ANSI/AWS) D1.1, Structural Welding Code.

3. New York City Building Code (NYCBC).

1.4 PERFORMANCE REQUIREMENTS

A. Furnishing and installation of the pipe piles shall conform to the NYCBC and these Technical Specifications. Where the requirements of these Technical Specifications are more rigorous, they shall be adhered to.

B. Pile design loadings, concrete strengths, diameters and wall thicknesses of steel pipe shall be as shown on the Construction Drawings or specified in the Technical Specifications. The ends of each pipe shall be perpendicular to its axis.

1.5 TEST PILES

A. Prior to installation of the interlocked pipe piles, the Contractor shall install two interlocked test piles in the interior of the Site to prove the proposed method of installation to ensure the operation does not cause loss of material outside of the casing that could be detrimental to adjacent structures.

B. Test pile location shall be subject to the approval of the Engineer.

1.6 SUBMITTALS

A. The Contractor shall submit shop drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Pile location plan, size and numbering system;

2. Plan and details of the temporary guide wall;
3. Pile location survey during installation;
4. Additional pile locations;
5. Final pile location survey; and
6. Pile installation sequence.

B. The Contractor shall also submit the following:

1. Pipe pile shop drawings;
2. Details of proposed pile installation equipment;
3. Material certification for piling (mill test reports);
4. Detailed welding drawings and material specifications;
5. Welder certifications;
6. Weld testing reports; and
7. Concrete mix design report.

1.7 PROJECT RECORD DOCUMENTS

A. Upon completion of installation of all piles, the Contractor shall submit to the Responsible Parties as-built drawings showing types and installed location of all piles, including obstructed, damaged and additional piles, as related to their reference points and lines, percentage out of plumb, the cutoff elevation, and length below cutoff for each pile.

B. Drawings shall be the same size as the Construction Drawings.

1.8 QUALIFICATIONS

A. The Work shall be performed by a the Contractor or a Specialty Subcontractor specializing in the specified pipe pile system and having experience installing the specified Support of Excavation (SOE)/Bulkhead under similar subsurface conditions.

1.9 GEOTECHNICAL MONITORING

A. The Contractor shall provide the monitoring stations at locations shown on the Construction Drawings or specified in Section 31 09 13 – Geotechnical Instrumentation and Monitoring.

B. All pile installation, removal of piling, and related pile installation activities shall be performed in a manner so that the specified threshold criteria is not exceeded.

C. The Engineer reserves the right to change the locations of the monitoring stations, as required during construction. The Contractor shall engage the services of an approved geotechnical consultant (who shall be a registered Professional Engineer in the State of New York) experienced in the monitoring of vibrations and movements, to install, maintain and monitor an approved monitoring system.

1.10 EXAMINATION OF THE SITE

A. The Contractor shall engage the services of a geotechnical consultant to make an inspection of the accessible existing structures, pavement and improvements adjacent to the pile installation site to examine and document their present condition prior to starting pile installation operations.

B. Photographs and measurements shall be taken by the Contractor or geotechnical consultant to record any conditions that may become the subject of possible damage claims.

C. The Contractor's geotechnical consultant shall prepare a report of such conditions, verified by the photographs, and signed by the personnel of the Contractor and geotechnical consultant.

1.11 WASTE MANAGEMENT

A. The Contractor shall properly handle and dispose of all drill spoils in connection with the work described in this Section, including soil, liquids, and debris in accordance with Section 02 51 19 – Excavated Material and Waste Management.

PART 2: PRODUCTS

2.1 INTERLOCKED STEEL PIPE PILES

A. Steel pipe piles shall be new, electric-fusion butt-welded and shall conform to the requirements of ASTM A252, Grade 3, having a minimum yield point of 50,000 pounds per square inch (psi).

B. All pipe welds shall be performed in accordance with the requirements of Part 2.3.C of this Section.

C. The Contractor shall submit detailed welding drawings and material specifications to the Engineer for approval. All welding shall be performed by certified welders in accordance with the requirements of AWS D1.1.

D. Ball and socket connectors for the pipe piles shall be standard WoM/WoF-s connector pairs as manufactured by PilePro, or approved equal. Connectors shall be fabricated of minimum ½-inch thick metal and shall be welded continuously to the pipe piles using E70XX electrodes conforming to AWS D1.1.

E. Ring bits for drilling the pipe piles shall be welded to the pipe pile tips and allow for interlocking with a down-the-hole hammer to advance the pile without rotation of the casing. Ring bits shall be fabricated of hardened steel for advancing the casing through obstructions such as concrete, stone, timber and steel.

2.2 CONCRETE FOR STEEL PIPE PILES

A. Concrete fill for steel pipe piles shall have a minimum 28-day compressive strength as shown on the Construction Drawings or specified in Section 03 37 26 – Underwater Placed Concrete.

2.3 SPLICES

A. For piles less than 60 feet in length, splices will not be permitted. For piles exceeding 60 feet in length, a maximum of one splice will be permitted and shall be located at least 30 feet below cut-off elevation.

B. Splices shall be made using full-penetration butt welds and develop the full strength of the member. Splice sleeves will not be permitted.

1. Length of pile to be spliced shall be secured in proper alignment so that no eccentricity results.

2. Details of the splices shall be submitted by the Contractor for the Engineer's approval.

C. Welding of joints shall be performed in accordance with the requirements of:

1. ANSI/AWS D1.1 Structural Welding Code; and

2. Relevant sections of the NYCBC.

D. All shop and field welding shall be performed by certificated welders under the immediate supervision of a representative of an independent standard testing agency designated for Special Inspection.

2.4 STEEL CORE

A. Steel core for the 34-inch diameter pipe piles shall be as specified on the Construction Drawings and in Section 05 12 34 – Structural Steel.

PART 3: EXECUTION

3.1 PIPE PILE INSTALLATION

A. Piles shall be located and installed as shown on the Construction Drawings, unless otherwise directed by the Engineer.

B. The Contractor shall cooperate with the Engineer in determining the penetration and length of pile and shall mark each pile at one-foot intervals before drilling or as required by the Special Inspector.

C. Spudding, jetting, predrilling will not be permitted, unless specifically approved by the Engineer in writing.

D. The Contractor shall maintain a positive head in the casing at all times to maintain hole stability and prevent heave at the bottom of the pile.

3.2 CUSHION BLOCK AND HAMMER (NOT USED)

3.3 JETTING (NOT USED)

3.4 PREDRILLING (NOT USED)

3.5 OBSTRUCTIONS

A. It is essential that the Contractor familiarize himself with the subsurface conditions at the Site so as to be prepared for drilling through obstructions. The filled First Street Turning Basin is expected to contain a significant amount of obstructions.

B. The Contractor shall have on hand suitable equipment for drilling through buried timbers, cribbing, concrete, steel, stone and similar obstructions.

3.6 TOLERANCE

A. Pipe piles shall be supported rigidly in position and in alignment with the drill mast.

B. Piles shall not be out of alignment by more than 1% of their length. The center of each pile at the level of cutoff shall not vary from its designated center by more than 2 inches.

3.7 PLACEMENT OF CONCRETE IN STEEL PIPE

A. No concrete shall be placed in a pile until all piles within a radius of 30 feet have been drilled and the pile has been inspected and approved for concrete placement by the Special Inspector. Concreting shall be performed in the presence of the Special Inspector.

B. The interior of the piles shall be sounded with a weighted tape just prior to concreting to verify the pile has been cleaned out to the pile bottom.

C. Concrete shall be deposited in the pile through a funnel or vertical chute having spacers at the neck to permit air escape during the filling operation and with baffles to prevent segregation of the concrete. Placing of concrete in each pile shall be continuous, and the filling of any pile shall not be commenced unless there is sufficient concrete on hand to fill it. Piles shall be filled with concrete to the elevations shown on the Construction Drawings.

D. Concrete shall be placed using tremie placement methods in accordance with Section 03 37 26 – Underwater Placed Concrete.

3.8 PILE CUTOFF

A. All piles shall be cut off to true planes at the elevation shown on the Construction Drawings.

B. Pipe piles requiring a final cutoff elevation below the existing or excavated ground surface shall be filled with concrete to the cutoff elevations.

C. Cutoffs are the property of the Contractor and shall be disposed of off-site.

3.9 PILE SURVEY

A. The Contractor shall engage the services of a licensed surveyor, for the performance of the survey work. The Contractor shall, at such times so as not to interfere with the progress of the installation, make surveys of the installed piles. The installed location of each pile shall be established by survey and shown on drawings prepared for this purpose.

B. Copies of the drawings shall be submitted by the Contractor in accordance with the provisions specified herein and in Part 3.10 of this Section. Survey information may be submitted on several drawings, each covering a partial area only, as the job progresses, in order to expedite the approval of the Work.

C. Upon completion of all pile installation, the Contractor shall submit to the Engineer drawings showing installed location of all piles as related to their reference points and lines, percentage out of plumb, the cutoff elevation, and length below cutoff for each pile. Drawings shall be the same size as the Construction Drawings.

3.10 ANALYSIS AND CORRECTIVE MEASURES

A. The analysis and redesign work called for herein shall be performed by the Engineer.

B. The Engineer will analyze the conditions at each pile to determine whether corrective measures are required. If corrective measures are not required, approval will be given for proceeding with the Work.

C. Corrective measures, for any piles installed more than 2 inches from the plan location, will be determined by the Engineer. If the corrective measures are not deemed feasible, the pile shall be removed in its entirety and replaced by another pile installed in the design location.

D. If corrective measures involve the installation of additional piles, the Engineer will prepare supplemental drawings showing the details of the required corrective work.

E. Cost of Additional Work

1. The cost of installing additional piles (as called for on the supplemental drawings for the corrective measures), shall be borne by the Contractor in the case of rejected, defective, damaged or misplaced piles.

3.11 DAMAGED OR MISPLACED PILES

A. All damaged or misplaced piles shall be removed, and new piles shall be installed as directed by the Engineer and at no cost to the Responsible Parties. Voids remaining from pulled piles shall be filled with flowable fill or clean granular fill at the Contractor's expense.

B. All damaged piles and cutoff sections shall be removed from the Site by the Contractor.

3.12 REJECTED PILES

A. When any pile exceeds the installation tolerances specified in Part 3.6 of this Section, it may be rejected.

B. When any installed pile has been so injured in drilling (due to causes other than obstructions encountered) as to be, in the opinion of the Engineer, unsuitable, or otherwise does not conform to the requirements of the Technical Specifications, such piles shall be rejected.

C. Rejected piles shall be removed from the Site by the Contractor.

3.13 ADDITIONAL PILES

A. Additional piles shall be installed in locations designated by the Engineer to replace rejected piles, at no additional cost to the Responsible Parties.

3.14 WITHDRAWN PILES

A. Piles driven in locations, other than in the permanent work, shall be removed after completion of drilling. Such piles, if undamaged, may be reused.

B. The Contractor shall also remove piles installed in the permanent work for inspection, if so ordered by the Special Inspector.

C. If the Contractor removes any piles drilled in the permanent work for his convenience, for the prosecution of the Work, or for any other reason, except at the direction of the Special Inspector, such piles shall be replaced at no additional cost to the Responsible Parties.

D. Where piles are withdrawn, the pile hole shall be backfilled with flowable fill or clean granular fill.

3.15 FOUNDATION PILES (NOT USED)

3.16 INSPECTION

A. All inspections will be performed by the designated Special Inspector.

B. The installation of each pile is a mandatory hold point for which prior notification of the Engineer is required, and installation of each pile shall be performed in the presence of the Special Inspector. Installation records will be kept by the Special Inspector.

C. The Contractor shall cooperate with the Special Inspector in determining the penetration depth and shall mark each pile before drilling as required by the Special Inspector.

3.17 WASTE MANAGEMENT

A. The Contractor shall properly handle and dispose of all drill spoils in connection with the Work described in this Section, including soil, liquids, and debris in accordance with Section 02 51 19 – Excavated Material and Waste Management.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 31 13

CHAIN LINK FENCES

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section includes providing and maintaining the fencing system for protection of the public and to prevent unauthorized persons from accessing the planting area.

a. Fencing shall conform to fencing layouts and details shown on the Construction Drawings, including but not limited to the following.

1) Fencing of galvanized steel chain link type together with base construction shall be installed to a minimum height of 8'-0".

2) Fencing systems shall be used to provide adequate protection of the public.

3) The Contractor shall maintain and/or perform repairs, reinstallations, or replacements as required to effect protection and security of the Site. The Contractor shall provide Work related modifications of fencing systems as required until otherwise directed by the Engineer.

4) The Contractor shall provide fittings, bracing, supports, brackets, anchors, accessories, hardware, and supplementary parts required to complete the Work of this Section, as approved by the Engineer.

5) The Contractor shall include cutting, fitting, drilling, tapping, and other preparation work of this Section to accommodate work specified with other Sections as required for attaching and installing fencing components and systems.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 03 30 00 – Cast-in-Place Concrete

1.3 REFERENCES

A. The following references and standards are used in this Section:

1. American Society of Testing and Materials (ASTM):

a. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

b. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

c. ASTM F552 Standard Terminology Relating to Chain Link Fencing.

d. ASTM F567 Standard Practice for Installation of Chain Link Fence.

e. ASTM F626 Specification for Fence Fittings.

f. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework.

g. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

1.4 SUBMITTALS

A. General

1. Refer to and comply with Section 01 33 00 – Submittal Procedures for procedures and additional submittal criteria.

B. Product Data

1. Material descriptions, construction details, dimensions of individual components and profiles, and finishes for the following:

a. Manufacturer's technical data and installation instructions for chain link fencing components of assembly.

C. Shop Drawings

1. Prepare layout of fence components to fit Site conditions as indicated and specified. Site plan showing layout of fence location with dimensions, elevation and details of attachments.

2. Show assembly in detail and inclusive of posts, rails, tension wires, extended posts, extension arms, hardware, and accessories. Provide schedule of materials, dimensions, sizes, weights, and finishes of components.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences similar in material, design, and extent to those indicated for this project and has the capabilities to fabricate, handle, and install fencing on concrete caps as indicated for project. Installer's previous experience shall have resulted in construction and work with a record of expeditious and successful in-service performance.

1.6 PROJECT / SITE CONDITIONS

A. Field Measurements: Verify layout information for the fence system required in relation to the property survey, existing or to be modified project conditions, and in relation to existing structures. Verify dimensions by field measurements.

PART 2: PRODUCTS

2.1 FENCING MATERIALS

A. General: Fences and barriers shall be structurally adequate, durable, and neat and uniform in appearance. Material must be new and suitable for intended purpose.

B. Supplementary Parts: The Contractor shall provide materials or assembly components as specified or shown for fencing or as necessary to complete installation, even though such supplementary parts are not shown or specified.

2.2 CHAIN-LINK FENCE MATERIALS

A. Provide chain link fencing complying with Chain Link Fence Manufacturers Institute's (CLFMI's) "Product Manual" as a minimum.

B. Line Posts: 2.375 inch (59 mm) outside diameter (OD), Schedule 40 galvanized steel pipe or galvanized "H" columns weighing not less than 2.7 lb./ft (13.18 kg/m²).

C. Corner and Terminal Posts: 2.875 inch (73 mm) OD, Schedule 40 galvanized steel pipe.

D. Top, Bottom and Brace Rail: 1.660 inch (42.16 mm) OD, plain end, sleeve coupled galvanized steel pipe.

E. Chain link fence fabric: 9 gauge galvanized steel wire. Fabric height shall be 8 feet (2.44 m), +/- 3/4 inch (20 mm), with knuckled, selvage edges on the bottom and top. Mesh shall be vertically-woven diamond mesh, with a nominal distance of 2 inches (50 mm) between parallel wires.

F. Tension Bars: ½" OD galvanized steel diagonal truss rod with turnbuckle.

G. Caps: Cast steel or malleable iron, galvanized, sized to post dimension, set screw retained.

H. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings shall be galvanized steel.

2.3 MISCELLANEOUS MATERIALS

A. Steel Brackets, Plates, and Shapes: Steel material shall comply with ASTM A36.

B. Grout and Anchoring Cements

1. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

2.4 FINISHES

A. Galvanized Surfaces: Galvanize surfaces in accordance with ASTM A123, with a coating of at least 1.20 ounce/square foot (oz/sq. ft.)

PART 3: EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, Site clearing, earthwork, pavement work, and other conditions affecting performance.

B. Confirm and indicate locations of utilities, drainage systems, underground structures, benchmarks, and property monuments as may be applicable. Consider conditions of future work that may be impacted by fence locations.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines and terminal posts: Do not exceed intervals of 500 feet (152.5 meters) or line of sight between stakes. Relate to and arrange together with existing fence systems at the Site or adjacent to the Site, as approved by the Engineer.

B. Sequencing: Install fence posts prior to planting installation. Install top and bottom rails and chain link infill after planting installation is complete.

3.3 INSTALLATION

A. General

1. Install chain-link fencing to comply with ASTM F567 and more stringent requirements specified.

a. Install fencing as indicated on the Construction Drawings or as approved by the Engineer.

b. Include cutting, fitting, drilling, tapping, and other preparation work as required for attaching and installing fencing systems.

c. Provide attachment devices of type, size, and spacing to suit condition.

d. Install fence barriers as indicated and to suit conditions at the Site to prevent unauthorized public entry and to protect the Work, persons, planting, and other conditions.

B. Post Setting

1. Posts Set into Concrete in Pipe Piles: Form or core drill holes not less than 1'-8" deep and 3/4"larger than OD of post. All post holes should be centered in pipe pile. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Terminal Posts: Locate terminal end and corner posts per ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.

B. Line Posts: Space line posts uniformly at 6'-9" on-center (OC) typical, 8 feet OC maximum.

C. Post Bracing Assemblies: Install according to ASTM F567, maintaining plumb position and alignment of fencing. Install braces at end posts, at both sides of corner posts, and at any posts that occur at grade changes. Locate horizontal braces at mid-height of fabric on fences. Install so posts are plumb when diagonal rod is under proper tension.

D. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

E. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts 12 inches (304 mm) OC and to braces 24 inches OC.

3.5 ADJUSTING

A. The Contractor shall provide all labor and material to furnish and install, reconfigure, maintain, repair and replace fencing until otherwise directed by the Engineer and/or EPA.

B. Final configuration of the Site fencing shall be as approved by the Engineer and/or EPA.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 31 24

WATERFOWL BARRIER

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall provide all labor, materials, equipment and incidentals to furnish, install, and maintain a waterfowl barrier fence immediately after planting the intertidal vegetative shelf, in accordance with this Technical Specification and the Construction Drawings.

1.2 RELATED SECTIONS

A. Section 01 11 00 – Summary of Work

B. Section 01 32 01 – Construction Progress Documentation

C. Section 01 33 00 – Submittal Procedures

D. Section 01 78 00 – Contractor Closeout Submittals

E. Section 32 91 13 – Planting Soils

F. Section 32 91 16 – Planting Soil Stabilization

G. Section 32 93 01 – Intertidal Vegetation

1.3 REFERENCES (NOT USED)

1.4 DEFINITIONS

A. Waterfowl Barrier: a system of fence, twine, and flash tape intended to deter herbivory of newly installed intertidal vegetation, particularly by Canada geese.

B. Intertidal Zone: the area between the land and sea that is covered by water at high tide and uncovered at low tide.

1.5 COORDINATION

A. Coordination with Intertidal Vegetative Shelf: The Contractor shall ensure that the waterfowl barrier fence encloses all planting areas per the Construction Drawings.

1. When replanting plugs or performing other maintenance tasks, promptly repair the waterfowl barrier fence.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: The Contractor shall conduct a pre-installation conference with the Engineer and the Responsible Parties prior to beginning the Work of this Section. At least seven (7) days' notice shall be given prior to the conference.

1. Conference attendance will also include the supervisor/foreman appointed to oversee the Work of this Section, the supervisor/foreman responsible for waterfowl barrier fabrication and installation, and other persons as deemed appropriate for coordination of the Work and quality control.

1.7 SUBMITTALS

A. Product Data

1. The Contractor shall submit a complete materials list (e.g., stakes, fence, twine, nails, etc.) of the items to be furnished under this Section with manufacturer's data sheets.

B. Samples

1. The Contractor shall submit to the Engineer samples of all materials (e.g., stakes, fence, twine, nails, flash tape, etc.) to be furnished under this Section.

1.8 QUALITY ASSURANCE

A. Further protection will be installed if waterfowl or other animals that will damage plantings are able to enter the exclusion area.

B. Survey tape will not be accepted in place of Mylar flash tape.

1.9 FIELD CONDITIONS

A. Field Measurements: The Contractor shall verify actual dimensions of planting areas by field measurements before proceeding with waterfowl barrier installation work.

B. Tidal Fluctuation: The Contractor shall install the waterfowl barrier in the intertidal zone only in dry conditions during low tide.

1.10 WARRANTY

A. The Contractor agrees to repair or replace waterfowl barrier that fails in materials, workmanship, or growth within the specified warranty period for intertidal vegetation.

1. Failures include, but are not limited to, the following:

a. Structural failures of stakes and twine, including falling or blowing over by tidal water flows or wind; and

b. Faulty performance of stake installation and/or twine attachment.

PART 2: PRODUCTS

2.1 MATERIALS – WATERFOWL BARRIERS

A. The waterfowl barrier fence shall be fabricated of the following:

1. Untreated, non-tropical, notched hardwood stakes (2 inches x 2 inches x 96 inches);

2. Ultraviolet resistant polypropylene extruded safety fencing having a mesh opening size of 1.5 inches (forest green color) Tensar BX 205 or approved equal;

3. Mylar flash tape, 2-inch width that reflects sunlight and generates noise in wind;

4. Twine shall be braided nylon and 0.125-inch diameter or conform to 80lb test minimum;

5. 2-inch roofing nails shall be hot dipped galvanized; and

6. 1.5-inch staples shall be hot dipped galvanized.

PART 3: EXECUTION

3.1 INSTALLATION

A. The waterfowl barrier fence shall be installed at the end of each day's planting to enclose newly planted material by skilled laborers using the proper tools and equipment for an aquatic environment. There shall be no exceptions.

B. The support stakes shall be located throughout the planted area in accordance with the Construction Drawings or as directed by the Engineer. The stakes shall be driven plumb and 1 foot from the edge of any plant material and to a minimum of 2 feet deep. The Contractor shall remove and replace all broken or splintered stakes at no additional cost to the Responsible Parties.

C. The extruded plastic safety fencing shall be installed so that there is a minimum of 2 inches buried below finished grade. The fencing shall be attached to the stakes with 1.5 inches hot dipped galvanized staples. Extruded plastic safety fencing shall extend around the full perimeter of the planting area and at 100-foot intervals within the planting area to create 100-foot by 100-foot cells.

D. The braided nylon twine shall be attached to 2 inches hot dipped galvanized roofing nails driven into the stakes around the sides of the fence. On the top, the twine shall be attached to the notches in the stakes. Each line across the top shall be woven in and out to provide increased stability during tide changes. The twine shall be pulled taught to reduce sagging.

E. Mylar flash tape shall be attached to top nylon twine at a minimum 3-foot interval. Tape shall be wrapped around twine several times to avoid slippage. A minimum of 1 foot length of tape should be present below attachment.

F. The Contractor shall provide access points or gates through the perimeter fence as necessary. These openings shall be closed and secured with fencing and nylon twine when not in use.

3.2 MAINTENANCE

A. The Contractor shall maintain the waterfowl barrier fence throughout the three (3) year plant warranty period. The waterfowl barrier shall be routinely inspected weekly and damaged areas repaired as necessary. Maintenance shall include the removal of all debris (from tidal action or land sources). The Contractor shall remove all unwanted and unsightly materials that have become attached to the fence as well as debris from within the enclosed area to prevent smothering of the plantings.

B. At the end of the three (3) year plant warranty period, the Contractor shall remove the waterfowl barrier fence without damaging the planted material. Any damaged plant material shall be replaced and maintained by the Contractor for an additional year at no additional cost to the Responsible Parties.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 91 13

PLANTING SOILS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section includes requirements for the following:

a. Planting soil furnished from off-site, including testing and analysis;

b. Sand planting soil for the intertidal vegetative shelf;

c. Inorganic soil amendments;

d. Fine grading of planting soil; and

e. Planting soil protection.

1.2 RELATED SECTIONS

A. Section 01 11 00 – Summary of Work

B. Section 01 32 01 – Construction Progress Documentation

C. Section 01 33 00 – Submittal Procedures

D. Section 01 78 00 – Contractor Closeout Submittals

E. Section 32 91 16 – Planting Soil Stabilization

F. Section 32 93 01 – Intertidal Vegetation

G. Section 32 31 24 – Waterfowl Barrier

H. Section 35 43 00 – Cap Construction

1.3 REFERENCES

A. "Official Methods of Analysis of AOAC International," latest edition, published by AOAC (formerly Association of Official Agricultural Chemists), 481 Frederick Avenue, suite 500, Gaithersburg, MD 20877.

B. American Society of Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428coordination & sequencing (610) 832-9585:

1. ASTM C33 Standard Specification for Concrete Aggregates

2. ASTM C136 Dry Sieving

3. ASTM D422-63 Hydrometer

4. ASTM D1556 In situ Density by Sand Cone

5. ASTM D1603 Carbon Black Content

6. ASTM D2256 Tensile Strength and Elongation

7. ASTM D4101 Polypropylene

8. ASTM D2101 Young's Modulus

9. ASTM D2922-01 Nuclear Density

10. ASTM D698 Standard Proctor
11. ASTM F1647-99 Organic Matter Content
12. ASTM D4972 pH

C. United States Department of Agriculture (USDA) Soil Survey Laboratory Methods Manual (No. 42, November 2004).

D. "Recommended Soil Testing Procedures for the Northeastern United States," 2nd Edition, Northeastern Regional Publication No. 493, (NRP-493), Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia, latest edition.

1. Document may be obtained on the web at: http://extension.udel.edu/lawngarden/1864-2/lawn-garden/soil-health-composting/recommended-soil-testing-procedures-for-the-northeastern-united-states/

a. Test for soil Organic Matter by loss of weight on ignition, as described in NRP-493, p. 59.

b. Test for soil Soluble Salts shall be by the 1:2 (v:v) soil:water Extract Method as described in NRP-493, p. 74.

E. Environmental testing shall be conducted by the Contractor and approved by the Engineer prior to import of any material in accordance with this Section and Section 35 43 00 – Cap Construction.

F. Code of Federal Regulations (CFR) Title 40, Chapter I-Environmental Protection Agency

1. The United States Department of Environmental Protection (EPA) 40 CFR Part 503 rule, Table 3, page 9392, Vol. 58 No. 32.

1.4 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

B. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

C. Finish Grade: Elevation of the finished surface of planting soil.

D. Intertidal Zone: the area between the land and sea that is covered by water at high tide and uncovered at low tide.

E. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce acceptable planting soil.

F. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

G. Planting Soil: Imported soil that provides nutrients, water, air, and the rooting environment essential for the development of a healthy shrub, plug, or seedling.

H. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.5 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Prior to commencement of any of the Work of this Section, the Contractor shall conduct a pre-installation conference at the Site with the Engineer. At least seven (7) days' notice shall be given prior to the conference.

1. Conference attendance will also include the supervisor/foreman appointed to oversee the Work of this Section; the supervisor/foreman responsible for soil preparation, mixes, and placement; and other persons as deemed appropriate for coordination of the Work and quality control.

1.6 ACTION SUBMITTALS

A. The Contractor shall submit a Planting Soil Plan to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures. The Planting Soil Plan will include the following:

1. Product Data, for each type of product indicated:

a. Include recommendations for application and use.

b. The manufacturer shall provide certifications on the product's key physical properties, describing the materials used, installation instructions, and general recommendations.

2. Product Certificates:

a. For inorganic soil amendments, signed by product manufacturer.

1) Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

b. For organic soil amendments, signed by product manufacturer.

1) Compliance with EPA 40 CFR Part 503 rule.

2) Compliance with Pennsylvania Code, Title 25, Environmental Protection, Chapter 271 Municipal Waste Management, § 271.914. Pollutant limits.

3. Samples for Verification, for each 100 cubic yards (CY) of planting soil delivered:

a. Sand planting soil: 5 lb. sample in labeled bag.

b. Compost: 5 lb sample in labeled bag.

4. Material Test Reports:

a. General: Submit written reports of each sample tested. Each report must include the following as a minimum and such other information required specific to material tested:

1) Date issued;

2) Project title;

3) Names of the Contractor and supplier;

4) Testing laboratory name, address and telephone number, and name(s), as applicable, of each field and laboratory inspector;

5) Date, place, and time of sampling or test, with a record of temperature and weather conditions;

6) Location of material source; and

7) Type of test.

b. Planting Soil Test Reports

1) Planting Soil for Testing Prior to Delivery: The Engineer will oversee collection of the soil samples. Each tested sample shall be a composite of eight randomly grabbed samples per 100 CY of planting soil to be delivered. Submit to the Engineer the laboratory test results for the organic matter, pH value, soluble salts, deleterious material, nutrients and gradation (see Part 1.8.E of this Section, below). These tests will be performed and signed by a certified soils laboratory.

2) Results of tests, including identification of deviations from specified ranges: Identify any toxic substance(s) harmful to plant growth or life, as well as recommendations for soil amendments, mix proportions, and methods of preparation, as applicable to specifications herein.

c. Organic Amendment Test Reports

1) Provide the results of tests, including identification of deviations from specified ranges, and identify any toxic substance(s) harmful to plant growth or life.

B. The Contractor shall submit quantity records on a weekly basis to the Engineer.

C. Environmental Testing

1. The Contractor shall conduct environmental testing as described herein and in accordance with Section 35 43 00 – Cap Construction. Testing results, including a description of sampling procedures, locations, and comparison to applicable criteria, shall be sent directly to the Engineer for approval prior to import of any material.

2. If the Engineer rejects the import source and/or is provided with sampling results that do not meet the acceptance criteria, alternative sources shall be located and resampled by the Contractor to the Engineer's satisfaction at no additional cost to Responsible Parties.

1.7 INFORMATIONAL SUBMITTALS

A. The Contractor shall submit the following to the Engineer in accordance with Section 01 33 00 – Submittal Procedures:

1. Qualification data for each testing agency; and

2. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Qualifications

1. Installer Qualifications: Engage an experienced installer who has completed landscaping and soil supply work similar in material, design, and extent to that indicated for this project, and who has a record of successful landscape establishment.

a. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

b. Experience: At least three years' experience in installation of intertidal vegetation and natural area growing medium.

c. Installer's Field Supervision: Installer is required to maintain an experienced full-time, English-speaking supervisor on-site when planting is in progress.

2. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the New York State Department of Agriculture, with the experience and capability to conduct the testing indicated, and that specializes in the types of tests to be performed. Rutgers Soil Testing Laboratory is an example of an acceptable laboratory.

B. All planting soil used on this project shall be tested and approved by the Engineer before placement.

C. Secure approval before stripping planting soil from a borrow area or delivering planting soil to the Site.

D. Soils Observation: The Engineer may request observation of sand planting soil at place of source or at the Site before placement, for compliance with design requirements. The Engineer retains the right to reject unsatisfactory material at any time during progress of the Work. Notify the Engineer of sources of soil materials seven (7) days in advance of delivery to the Site.

E. Planting Soil Testing and Analysis: All testing described herein shall be conducted by the Contractor at the source facility and approved by the Engineer prior to import to the Site. Any material delivered to the Site that is not approved by the Engineer shall be removed from the Site at the Contractor's sole expense.

1. For each 200 CY of planting soil delivered to the Site, prepare a composite sample and furnish a soil analysis and a written report by a qualified soil testing laboratory stating percentages or concentrations of:

a. Organic matter (loss on ignition method);

b. Gradation (sand, silt, and clay content);

c. Deleterious material:

1) Environmental testing shall be conducted and compared to the Unrestricted Use Soil Cleanup Objectives (SCOs) in New York State Department of Environmental Conservation (NYSDEC) 6 New York Codes, Rules and Regulations (NYCRR) Part 375. Note that the sampling frequency described herein is greater than that specified in Section 35 43 00 – Cap Construction. In the event of any conflicts between this Section and 35 43 00 – Cap Construction, the greater sampling frequency shall prevail at no additional cost to the Responsible Parties.

2) Solid waste as described in NYSDEC 6 NYCRR Part 360 shall be considered unacceptable material and prohibited to be imported to the Site (reference NYSDEC Part 375 SCOs for Unrestricted Use);

d. pH;

e. Acid-producing soil (iron sulfide) test;

f. Salinity; and

g. Mineral and plant nutrients (Kjeldahl N, P, K, Ca, Mg, Mn, B, Cu, Z).

1.9 DELIVERY, STORAGE, AND HANDLING

A. Accessory and Packaged Materials

1. Deliver packaged materials in unopened standard size bags or containers, each clearly bearing the name, guarantee, and trademark of the producer, material composition, manufacturers' certified analysis, and the weight of the material.

2. Packaged material shall be stored off the ground and covered in a manner to prevent materials from getting wet or damp and in such manner that material effectiveness will not be impaired.

B. Bulk Materials Deliveries

1. Deliver bulk materials with each individual shipment accompanied by an affidavit and/or certification from the vendor (supplier), countersigned by the Contractor upon receipt, identifying the material type, composition, analysis, and weight, and certifying that the material furnished complies with specification requirements of this project.

2. Affidavits and/or certifications for bulk materials shall be furnished in duplicate with one copy submitted to the Engineer at the end of day of shipment receipt at the Site, and the second copy retained with the material or on file with the Contractor.

3. Planting soil mixes may be delivered to the Site and stockpiled only in areas specifically designated by the Engineer. Materials shall be protected from contaminants and erosion as well as other dissimilar soil mixes. Temporary storage means and methods shall be submitted and approved by the Responsible Parties or the Engineer.

4. Planting soil mix storage areas shall be kept neat and clean, and necessary precautions shall be taken to avoid damage to existing plants, turf areas and Site structures.

5. Planting soil mix deliveries shall include delivery ticket(s) with the name and address of vendor, date and estimated volume of each delivery.

6. Planting soil mixes and compost materials stored on-site shall be covered with a tarpaulin until time of actual use.

7. Stockpiles of on-site or off-site planting soil shall not exceed 100 CY, and shall be no more than four (4) feet in height to prevent anaerobic conditions within the piles. Soil shall be stockpiled for no more than thirty (30) consecutive calendar days.

1.10 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. Utilities: Determine location of existing and proposed above grade and underground utilities and perform the Work in a manner that will avoid damage. Hand excavation, as required, will be at no additional cost to the Responsible Parties.

2. Should the Contractor, in the course of the Work, find any discrepancies between Construction Drawings and physical conditions, it will be the Contractor's duty to inform the the Engineer immediately in writing for clarification. The Work done after such discovery, unless authorized by the Responsible Parties or the Engineer, shall be done at the Contractor's risk.

3. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Engineer before installation of planting soil.

B. Perform both off-site mixing and on-site soil work only during suitable weather conditions. Do not disc, rototill, or work soil when frozen, excessively wet, or in otherwise unsatisfactory condition.

C. Planting soil mixes shall not be handled, hauled, or placed during rain or wet weather or when wet near or above field capacity.

D. Tidal Fluctuation

1. Install planting soils within intertidal areas only in dry conditions during low tide.

1.11 SEQUENCING AND SCHEDULING

A. Adjust, relate together, and otherwise coordinate the Work of this Section with the Work of the project and all other Sections of the Technical Specifications.

B. No placement of planting soil mixes shall occur until subgrade conditions, including earthwork, subsurface utilities and gravel drainage layer, are completed and approved.

C. Allow in schedule of operations for the Engineer to observe subgrades and transition layers before further construction work or operations are performed. Placement of all planting soil will be monitored and observed by the Engineer.

D. Sequence planting soil installation so as to not drive or operate any mechanical equipment over any installed planting soil during storage, transport, placement or after installation of planting soil. Planting soil that has been driven over shall be removed from the Site and legally disposed of at the Contractor's expense.

E. Planting soil mixes should be stored and handled to be kept free of seed and rhizomes of invasive or weed species. Any material that has been contaminated should be disposed of and replaced at no additional cost to the Responsible Parties.

1.12 REGULATORY REQUIREMENTS

A. Comply with all rules, regulations, laws and ordinances of Federal, State, and local authorities having jurisdiction. Provide labor, materials, equipment, and services necessary to make the Work comply with such requirements without additional cost to the Responsible Parties.

B. Procure and pay for permits and licenses required for the Work of this Section.

PART 2: PRODUCTS

2.1 SAND PLANTING SOIL FOR INTERTIDAL VEGETATION SHELF

A. Only environmentally clean material (i.e., material that has been tested and found to contain levels of organic compounds or inorganic analytes that do not exceed the Unrestricted Use SCOs in NYSDEC 6 NYCRR Part 375 or other approved testing that demonstrates material is not toxic to aquatic biota) shall be used. Material shall not contain foreign materials of any kind.

B. Planting soil for the intertidal vegetative shelf shall be a sand (85-100% sand) as classified by the USDA. The sand fraction analyses should be in the following approximate proportions: medium fraction sand content should be approximately 40-45%, very coarse and very fine fractions should be approximately 10% each, with the remainder compromising the coarse and fine sand fractions.

C. Planting soil shall be free of refuse, hard clods, woody vegetation, stiff clay, construction debris (of any kind), boulders, stones larger than 1.5 inches, chemicals, or other deleterious material toxic to any vegetation used on this project.

D. The gradation of planting soil shall be determined by a laboratory using the methods of the USDA Soil Survey Laboratory Methods Manual (No. 42, November 2004). The gradation of the planting soil as determined by USDA classifications shall be within the following ranges.

1. Ranges:

   0-4% gravel

   85-100% sand

   0-10% silt

   0-5% clay

2. Classification/sieve size:

   2.0 inch to 2.0 millimeter (mm) gravel

   2.0 mm to 0.5 mm sand

   0.05 mm to 0.002 mm silt

   <0.002 mm clay

E. In addition to the above gradation, the Contractor shall provide the percentage of particle sizes corresponding to USDA classifications:

   Very coarse sand (2.0 mm to 1.0 mm)

   Coarse sand (1.0 mm to 0.5 mm)

   Medium sand (0.5 mm to 0.25 mm)

   Fine sand (0.25 to 0.1 mm)

   Very fine sand (0.1 mm to 0.05 mm)

   Silt (0.05 mm to 0.002 mm)

   Clay (<0.002 mm)

F. The pH value of planting soil shall be (6.4-7.5) as determined by an approved laboratory using soil pH [Water (1:1. V:V)] procedures as described in the "Soil Testing Procedures for The Northeastern United States, 2nd Edition, Northeast Regional Publication, Agricultural Experiment Station, University of Delaware, Bulletin #493, latest edition." Amendment of soil to lower pH is not permitted.

G. Sand Planting Soil shall be tested for petroleum hydrocarbons. Sand Planting Soil shall contain less than 150 parts per million (ppm) total petroleum hydrocarbons. All soil testing higher than the allotted concentration shall be rejected from the Site.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: Ground limestone in the producer's standard bags containing not less than 90% of calcium and magnesium carbonates equivalent to not less than 45% 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

B. Sulfur: Granular, biodegradable, containing a minimum of 90% sulfur, with a minimum 99% passing through No. 6 sieve and a maximum 10% passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20% iron and 10% sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Sand: Clean, washed, natural or manufactured, free of toxic materials, complying with ASTM C33.

2.3 FILTER FABRIC

A. Nonwoven polypropylene fabric.

B. Not less than 4 ounces per square yard OZ/SY.

C. Resistant to the chemical actions of the soil and water and nonbiodegradable.

D. Fabric to prevent the migration of soil particles into the canal while allowing the free flow of water from the subsoil to the canal.

E. Acceptable manufacturers:

1. Mirafi 140N by Mirafi Inc;

2. Propex 4545 by Amoco Fabrics Co.; or

3. Approved Equal

PART 3: EXECUTION

3.1 GENERAL

A. Prior to the procurement of planting soil and starting delivery of soil, all approvals for those items (as required in Section 01 33 00 – Submittal Procedures) shall be given in writing and accepted by the Engineer and/or EPA.

B. Prior to the placement of planting soil, the subgrade must be accepted by the Engineer.

3.2 EXAMINATION

A. Examine areas to receive planting soils for compliance with design requirements and other conditions affecting performance. The Contractor shall not place any planting soil on subgrade prior to inspection and approval by the Engineer for compliance of subgrade with specifications. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Deficiencies include, but shall not be limited to, the following:

a. Construction debris present within the planting areas;

b. The subgrade is at incorrect depths for installing the designed soil profile and drainage layer;

c. Incomplete irrigation and/or subsurface drainage installation;

d. Incomplete lighting and exterior electrical installation;

e. Conflict with underground utilities;

f. Subgrade contaminated with oils, compressible material, silt or clay; and

g. Subgrade must infiltrate water at the rate of at least one inch per hour.

B. Prior to excavation for planting soil, ascertain the location of surface and subsurface utilities.

1. Take proper precautions so as not to disturb or damage sub-surface elements. Failure to take proper precautions and any requisite repairs to damaged utilities or subsurface elements shall be at the Contractor's own expense and without modification to the schedule.

2. If subsurface elements are uncovered at a specific location for a plant item, notify the Engineer immediately for approved relocation of item(s).

3.3 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, existing trees, shrubs, and plantings from damage caused by soil placement operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to walkways, adjacent properties and the canal.

3.4 PLACEMENT OF SAND PLANTING SOIL FOR INTERTIDAL VEGETATIVE SHELF

A. Limit subgrade preparation to areas immediately receiving planting soil material.

B. Filter fabric: Lay filter fabric over drainage layer with 12-inch minimum laps at splices. Spread filter material in the same direction as fabric overlap. Patch tears and holes in fabric with a piece of the same fabric material large enough to cover the tear or hole plus a 12-inch overlap.

C. Spread planting soil mix over filter fabric as required in 12-inch maximum lifts.

D. No mechanical compaction shall be required in the intertidal vegetative shelf.

3.5 PLANTING SOIL FINISH GRADING

A. The locations and elevations of constructions are indicated on the Construction Drawings and, unless inconsistencies are brought to the written attention of the Engineer prior to the commencement of the Work, the Contractor shall be held responsible for the proper location and elevations of the completed Work.

B. Uniformly smooth grades of all areas, including excavated and fill sections and adjacent areas for subsequent work. The subgrade shall be reasonably smooth, compacted and free from irregular surface changes.

C. The required subgrade elevation shall be such that when planting soil material is added, the final elevations will be those shown on the Construction Drawings.

D. Finish grading will be within one tenth of a foot (0.1') of the elevations shown on the Construction Drawings.

E. Grades not otherwise indicated shall be uniform levels or slopes between such points and existing grades, except that the surface shall be rounded at abrupt changes or slopes. Care shall be exercised in grading all flat areas so as to prevent low spots and water pockets.

F. Before any placement of planting soil mixes on the existing or prepared subgrade, verify preparation to design line and grade.

3.6 FIELD QUALITY CONTROL

A. In situ density tests shall be carried out by the Contractor at a frequency of one test per layer per 2,000 square feet for all planting soil areas. In situ tests shall be carried out utilizing either Sand Cone or Nuclear Density methodologies at the Contractor's discretion. Test results shall be

compared with Standard Proctor Maximum Dry Densities, as determined in advance for each material.

B. In situ percolation tests shall be carried out by the Contractor at a frequency of one test per 2,000 square feet for all planting soil areas.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by the Work from paved areas. Clean wheels of vehicles before they leave the Site to avoid tracking soil onto roadways, walks or other paved areas.

B. Repair and reestablish grades to the specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Scarify or remove and replace soil materials to depth as directed by the the Engineer; reshape and re-compact as per approved settlement methodology.

D. Maintenance of Planting Soil Grading

1. Protection of Newly Graded Areas

a. Immediately install erosion control fabric over newly graded areas to protect from erosion, as outline in Section 32 91 16 – Planting Soil Stabilization.

b. No mechanical equipment shall be operated over any planting soil mixes either during or after placement.

c. Keep all graded planting soil areas free of trash and debris.

d. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.

3.8 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off-site.

3.9 ACCEPTANCE

A. Confirm that the final grades of the soils are at the proper finish grade elevations;

B. Adjust grade as required to meet the contours and spot elevations noted on the Plans; and

C. Request the presence of the Engineer to inspect final grade.

D. Do not proceed with the remaining Work until the Engineer and EPA has given his/her written approval of the final grade.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 91 16

PLANTING SOIL STABILIZATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall furnish all labor, equipment and materials to prepare the final grade within the Site as specified on the Construction Drawings or as directed by the Engineer. The Work shall be done in accordance with the Technical Specifications and in conformity with the lines, grades, thicknesses, and typical sections and details shown on the Construction Drawings or as established in the field by the Engineer. The entire intertidal vegetative shelf shall be stabilized with erosion control fabric as further detailed and specified below.

1.2 RELATED SECTIONS

A. Section 01 11 00 – Summary of Work

B. Section 01 32 01 – Construction Progress Documentation

C. Section 01 33 00 – Submittal Procedures

D. Section 01 78 00 – Contractor Closeout Submittals

E. Section 32 31 24 – Waterfowl Barrier

F. Section 32 91 13 – Planting Soils

G. Section 32 93 01 – Intertidal Vegetation

1.3 REFERENCES (NOT USED)

PART 2: PRODUCTS

2.1 MANUFACTURER

A. BioD-Mat 70 from RoLanka, telephone 770-506-8211 (rolanka@rolanka.com);

B. KoirMat 700 from Nedia Enterprises, Inc., telephone 571-223-0200 (nedia@nedia.com); or

C. Approved Equal

2.2 MATERIALS – EROSION CONTROL FABRIC

A. Erosion Control Fabric shall be a 1/2-inch woven mesh made entirely of coir yarn, weighing a minimum of 700 grams per square meter, and sold in rolls 164 feet long by 6.5 feet wide. Coir fabrics are available under various trade names, for example as BioD-Mat 70 from RoLanka, or KoirMat 700 from Nedia Enterprises, Inc.

B. Similar products are available in the erosion control trade and may be submitted for approval. Not permissible are products with synthetic components, or non-woven products. Use only at minimum eight (8)-inch long metal sod staples or wooden stakes to hold fabric in place. So-called biodegradable sod staples will not be accepted for this use.

PART 3: EXECUTION

3.1 CONSTRUCTION METHODS

A. Grading within the Site shall be accomplished with the least amount of soil compaction possible. Once a portion of the Site has been graded to final elevations, avoid operating or traversing the area with equipment.

3.2 EROSION CONTROL FABRIC

A. Erosion control fabric will be placed throughout the intertidal vegetative shelf, and buried in a 6-inch deep trench on the east and west side of the vegetative shelf prior to planting.

B. The erosion control fabric shall be placed in roof-shingle fashion on the prepared surface in such a manner that flowing surface water that may overtop the intertidal vegetative shelf does neither undermine nor flip up the fabric. Fabric shall be stapled with 8-inch sod staples 36 inches on center.

C. Planting of plugs will be performed within the existing weave of the fabric.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 93 01

INTERTIDAL VEGETATION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. This Section includes the furnishing of all equipment, materials, labor and services necessary for the proper execution of the planting of 2-inch intertidal vegetation plugs and maintenance for three years, as specified herein and as shown on the Construction Drawings, including all incidental and appurtenant work required for a complete job.

2. Construct intertidal vegetative shelf planting areas as indicated on the Construction Drawings, including excavation, placement of corresponding soil material and installation of plants.

1.2 RELATED SECTIONS

A. Section 01 11 00 – Summary of Work

B. Section 01 32 01 – Construction Progress Documentation

C. Section 01 33 00 – Submittal Procedures

D. Section 01 78 00 – Contractor Closeout Submittals

E. Section 32 91 13 – Planting Soils

F. Section 32 91 16 – Planting Soil Stabilization

G. Section 32 31 24 – Waterfowl Barrier

H. Operations Maintenance and Monitoring Plan (OM&MP)

1.3 REFERENCES

A. American Association of Nurserymen, Inc. (American National Standards Institute) Nursery Stock (ANSIZ60.1 – latest edition)

B. Manual of Vascular Plants of the Northeast United States and Canada, Gleason and Cronquist, 1991

C. A Checklist of New York State Plants, Contributions to a Flora of New York State, Checklist III, Bull. #458, Richard S. Mitchell, State Botanist, New York State Museum, 1986.

1.4 SUBMITTALS

A. The Contractor shall submit an Intertidal Vegetation Plan to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures. The Intertidal Vegetation Plan will include the following.

1. List of Materials/Suppliers: Submit a complete materials list of items to be provided under this Section for review by the Engineer before the purchase or use of any such material. Submission requirements for Sand Planting Soil are described in Section 32 91 13 – Planting Soils.

2. Method of Work: Submit a list of proposed methods of execution of the Work under this Section for review by the Engineer and EPA when proposed methods are different from, or supplementary to, those specified herein.

3. Maintenance Instructions: Recommended procedures to be established by the Responsible Parties or the Engineer for maintenance of intertidal vegetation during a calendar year. Submit prior to final completion inspection.

4. The Contractor must submit the following information to the Engineer and EPA for review and approval within 60 days following the Notice to Proceed.

    a. Subcontractor(s): The subcontractor for intertidal vegetative shelf planting must be approved by the Engineer. The subcontractor proposed will be evaluated on the following criteria:

        1) Prior experience in the installation, restoration, and maintenance of intertidal planting projects, and familiarity with the growing requirements of the vegetation used on this project. References and photographs of previous intertidal planting projects shall be submitted to the Engineer for review and approval. The projects should have been completed within at least the past five years. Photographs of past projects shall have been taken at the start of the project and two years after completion;

        2) Demonstration of the capacity to accomplish the Work in the time allotted. Resumes and qualifications of key personnel that will be present at all times on the Site while the Work is in progress;

        3) Experience with other agencies, such as the New York City Department of Parks and Recreation, New Jersey Department of Environmental Protection, Hackensack Meadowlands Development Commission, Central Park Conservancy, Botanic Gardens. Provide references and a specific contact person;

        4) Current membership with appropriate ecological and wetland restoration organizations; and

        5) Other references or experience deemed appropriate to obtaining approval.

    b. The following is required prior to the start of the Work:

        1) List of all materials and certificates specified within this item;

        2) Schedule / Methods of Operation / Three-year Maintenance Plan;

        3) List of Equipment; and

        4) Intertidal Vegetative Shelf Maintenance Schedule.

1.5 QUALITY CONTROL

A. Sources

1. All plant material and planting instructions are provided herein.

2. All soil material and instructions are provided in Section 32 91 13 – Planting Soils.

PART 2: PRODUCTS

2.1 MATERIALS

A. Plant material shall be as specified herein, and as shown on the Construction Drawings.

PART 3: EXECUTION

3.1 PREPARATION

A. All plants shall be examined and approved by the Engineer prior to installation.

B. Finished grades shall be established with a minimum of two feet of planting medium and allowed to acclimate to at least two full tide cycles to ensure proper hydrology and flushing. Soil shall be placed corresponding to the types, elevations and areal extents shown in the Construction Drawings. Prior to starting planting, the Engineer must approve the finished grade. The Engineer shall observe natural area soil material either at place of source or at the Site before placement for compliance with the design requirements. The Engineer retains right to reject unsatisfactory material at any time during progress of the Work.

C. The Contractor shall install erosion control fabric prior to planting, as outlined in Section 32 91 16 – Planting Soil Stabilization.

D. The Contractor shall install 2-inch plugs 1-foot on center, triangle spacing, and coordinate all planting and related work during low tide conditions (i.e., from the falling mid-tide through low tide to the rising mid-tide period) that occur during normal working hours.

E. Installation of the waterfowl barrier (Section 32 31 24 – Waterfowl Barrier) must be approved by the Engineer prior to the installation of plugs. All planted areas must be completely enclosed by the waterfowl barrier fence at the end of each day's planting. There shall be no exceptions.

F. Plants shall be delivered only when preparations for planting have been completed and plants can immediately be installed. If planting is delayed for more than six hours after delivery, set plant material in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Do not remove container-grown stock from containers before time of planting.

2. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet, condition.

3.2 TIME OF PLANTING AND TRANSPLANTING

A. Unless otherwise directed by the Engineer in writing, plugs shall be planted from May 1 to July 15. Perform actual planting only when weather conditions are suitable for optimal benefit to the plant. No plant material shall be planted when the ground is frozen. Notify the Engineer at least three (3) days (excluding weekends) in advance before proceeding with any planting operations.

1. No shipment of plant materials shall be unloaded or planted by the Contractor until such materials have been inspected and accepted by the Engineer, and inspection certificates, if any, have been delivered.

2. The Contractor shall proceed with and complete the Work expeditiously, working within the seasonal limitations.

3. Determine location of underground utilities and perform the Work in a way that shall avoid possible damage. Hand excavate, as required. The Contractor assumes responsibility for damage to underground utilities when excavating and is advised of "One Call" @ 800-272-4480, a service that marks underground facilities on the surface, prior to excavation. Maintain grade stakes set until removal is approved by the Engineer.

4. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Engineer before planting.

3.3 EXCAVATION AND PLANTING HOLES

A. Sizes of planting pits shall be as proposed in the Contractor's approved method of work submittals.

B. Planting holes shall be dug large enough and deep enough to accommodate the entire root mass.

3.4 PLANTING INTERTIDAL VEGETATION SHELF PLUGS

A. No planting shall be done except in the presence of the Engineer. While plugs are being distributed in planting beds or are awaiting planting after distribution, the Contractor shall protect the roots from drying out; the means employed shall be satisfactory to the Engineer. Care shall be exercised in setting the plants plumb and such that the top of the root ball lies flush with the soil surface.

B. All plant plugs shall be planted upright and not at an angle. Planting holes shall be dug large enough and deep enough to accommodate the entire root mass. The plugs shall be planted with no twisted or balled roots and shall be planted with no roots exposed above the grade line. The soil shall be hand packed around the entire plug root mass.

C. No fertilizers shall be used when installing plugs.

D. Planting Schedule: May 1 to July 15

3.5 LANDSCAPE WARRANTY AND REPLACEMENTS

A. All intertidal vegetative shelf Work shall have a maintenance and replacement guarantee for a period of three years beginning at the date of acceptance of the Work or the date of substantial completion, whichever is later. The Contractor shall request in writing an inspection of all of the Work when completed to begin the maintenance and warranty period.

B. A minimum coverage of 90% of desired vegetation is required for final acceptance.

C. During the warranty period, plant replacement shall be performed by the Contractor at the request of the Responsible Parties, Engineer, or EPA. Areas requiring plant replacement shall be identified as either:

1. A two-foot diameter area or larger that was planted but has not taken root; or

2. Three consecutive plants (planted 1 foot apart) that have not survived.

D. Unless a written waiver of this clause is issued, under the terms of the guarantee, replacement plants shall be chosen only by the Engineer.

E. During the warranty period, annual monitoring shall be performed by the Contractor in accordance with the OM&MP. Annual reports shall include: 1) an evaluation of the data collected in the field; 2) Site photographs; and 3) field data sheets.

3.6 MAINTENANCE

A. The Contractor shall submit for review, prior to the start of the Work, an Intertidal Vegetative Shelf Maintenance Schedule covering a three-year period. Planting shall not proceed until this schedule has been approved by the Engineer. Refer to the OM&MP for further requirements.

B. Maintenance includes:

1. Trash and debris removal;
2. Vegetation inspection;
3. Weeding; and
4. Drainage inspection.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 35 43 00

CAP CONSTRUCTION

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall provide all labor, materials, equipment, and incidentals required to perform all filling and other activities necessary to complete the Work.
2. Place sand backfill after material removal to prepare surface for capping.
3. Place a cap in the basin consisting of three primary layers as follows:
    a. Sand Leveling Layer;
    b. Treatment Layer; and
    c. Ecological Habitat Layer.
4. Structural concrete for underwater applications will be placed between the armor layer and the bulkheads.
5. Place a cap on the intertidal vegetative shelf consisting of four primary layers as follows:
    a. Low permeability clay mat;
    b. Gravel;
    c. Sand; and
    d. Topsoil.

B. Coordination

1. Review procedures under this and other Sections and coordinate the work that must be performed with or before the cap construction Work. The cap shall be installed after excavation and surface preparation are complete in accordance with Section 31 23.16 – Excavation and the Construction Drawings.

1.2 RELATED SECTIONS

A. Section 01 32 01 – Construction Progress Documentation

B. Section 01 33 00 - Submittal Procedures

C. Section 01 57 19 – Temporary Environmental Controls

D. Section 01 71 23.16 – Construction Surveying

E. Section 02 51 00 – Decontamination

F. Section 32 91 13 – Planting Soils

G. Section 31 23.16 – Excavation

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) International Standards

B. American Association of State Highway and Transportation Officials (AASHTO) Standards

C. United States Environmental Protection Agency (EPA)

1. EPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods:

a. Priority Pollutant Metals (EPA 6000/7000 Series Methods);

b. Volatile Organic Compounds (VOCs; EPA Method 8260);

c. Semi-volatile Organic Compounds (SVOCs; EPA Method 8270);

d. Chlorinated Pesticides (EPA Method 8081); and

e. Polychlorinated Biphenyls (PCBs; EPA Method 8082).

D. New York Department of Environmental Conservation (NYSDEC):

1. NYSDEC Environmental Remediation Programs of December 14, 2006 Part 375 – 6 Remedial Program Soil Cleanup Objectives.

E. New York State Department of Transportation (NYSDOT):

1. NYSDOT Standard Specifications and Standard Sheets, Construction and Materials (USC), latest version.

1.4 DEFINITIONS

A. Armor Layer – Layer overlying the Treatment Layer, designed to protect the other cap layers by withstanding erosional forces in the restored basin. The armor layer will be comprised of open-cell articulated concrete blocks (ACBs).

B. Backfill – sand backfill shall be placed after material removal is complete to prepare the surface for capping.

C. Ecological Habitat Layer – The ecological habitat layer is comprised of both the gravel placed within the voids of the ACB mats used in the armor layer and the sand that constitutes the isolation and filter layer.

D. Fill – Fill means placing cap construction materials to the thicknesses or elevations indicated on the Construction Drawings or as directed using specified materials.

E. Granular Activated Carbon (GAC) – Processed carbon with micropores and high sorbent surface area intended to sorb dissolved phase contaminants.

F. Gravel – The portion of the intertidal vegetative cap on top of the low permeability clay mat.

G. GAC and Sand – The portion of the Treatment Layer comprised of GAC mixed with sand.

H. Isolation and Filter Layer – Clean sand layer that will be placed above the Treatment Layer to serve as the base for the armoring layer.

I. Low Permeability Clay Mat – Bottom layer of the cap to be installed on the intertidal vegetative shelf.

J. Oleophilic Clay (OC) – Clay mineral treated with a quaternary amine resulting in an oleophilic material.

K. OC and Sand – The portion of the Treatment Layer comprised of OC mixed with sand.

L. Reactive Material – Adsorptive material that can adsorb and sequester contaminants, such as OC and GAC.

M. Sand – Layer of clean sand placed on the intertidal vegetative shelf above the gravel layer.

N. Sand Leveling Layer – Layer of clean sand placed to provide a level base. The material will be placed on top of the undisturbed material / dredged sediment surface.

O. Structural Concrete for Underwater – Structural concrete placed underwater to be located between the edge of ACB mats and the bulkheads.

P. Topsoil – Layer of topsoil to be installed as the final layer on the intertidal vegetative shelf to support intertidal plantings.

Q. Treatment Layer – Two distinct adsorptive treatment layers: lower layer comprising OC and Sand and upper layer comprising GAC and Sand.

R. Best Management Practices (BMPs): BMPs shall be implemented by the Contractor at the direction of the Engineer, and shall include, but are not limited to, the following operational procedures:

1. Implement material removal in a manner that ensures stable slopes along the exposed face of uncut areas inside the material removal area boundary to minimize bank sloughing or failure. This may involve a stairstep configuration of bucket bites in continuous areas where the thickness of the material removal cut to achieve the required removal depth is greater than two times the bite depth of the material removal bucket being used at that location; and

2. Implement material removal of slopes in a stairstep fashion where the bucket bites proceed from the top of the slope to the bottom of the slope to minimize sloughing.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Testing Laboratory

a. Retain the services of an independent testing laboratory to perform quality assurance and quality control (QA/QC) testing required in this Section. The testing laboratory shall be authorized to operate in New York State to perform quality assurance testing required in this Section.

b. The testing laboratory shall have current National Environmental Laboratory Accreditation Program (NELAP) and New York State Environmental Laboratory Approval Program (ELAP) certification from a recognized state or federal laboratory accreditation program for the specific methods they are performing.

c. The laboratory shall be capable of providing detection limits at or below NYSDEC Technical Guidance for Screening Contaminated Sediments or 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use soil cleanup objectives to allow for comparison of the analytical results to those objectives.

2. Off-site Fill Sources

a. The source of off-site general fill shall be a NYSDEC-permitted mine, pit, or quarry, and shall be approved by NYSDOT for furnishing aggregates for NYSDOT projects.

B. Quality Assurance Material Testing for Off-site Materials

1. Materials used in the Work may require testing and retesting, as directed by Engineer, during the project. The Contractor shall provide the Engineer with free access to material stockpiles and facilities at all times. Costs for testing shall be the Contractor's responsibility.

2. The Engineer reserves the right to visit each material source and conduct visual observation of the materials proposed for use. The Contractor shall coordinate access with the material sources for the Engineer to perform visits.

3. QA/QC testing of the imported materials shall be performed at the source location prior to shipment to the Site unless otherwise approved by the Engineer.

4. Results of the tests shall be submitted to the Engineer within 24 hours of test completion and prior to material use on the project. The Engineer reserves the right to reject material based on the results of these conformance tests or independent QA/QC testing conducted by the Engineer. Rejected materials shall be removed from the Site at no cost to the Responsible Parties (if delivered without the Engineer's approval).

5. Required Quality Assurance Material Testing: Perform the testing described below at the frequency indicated. Additional sampling may be required at the discretion of the Engineer if concerns arise that the characteristics of the fill materials have changed.

    a. Gradation in accordance with ASTM D6913 and D5519-15 (as appropriate). Perform one test for each type and source of material. Test one sample per 2,000 tons of imported material.

    b. Analytical testing in accordance with the standards specified in Part 1.3 of this Section for VOCs, SVOCs, PCBs, priority pollutant metals, and chlorinated pesticides, in order to demonstrate that off-site materials meet the Unrestricted Use soil cleanup objectives outlined in 6 NYCRR Part 375 (Environmental Remediation Programs), as well as the cleanup levels established in the Record of Decision (ROD). Test one sample for every 250 cubic yard (cy) batch of imported fill type from each specific fill source for the first 500 cy, and then one sample per each additional 500 cy or fraction thereof.

        1) Gravel, rock or stone backfill, consisting of virgin material from a permitted mine or quarry, will be exempt from pre-characterization analytical sampling requirements provided that it contains less than 10% (by weight) material that would pass through a size 80 sieve.

        2) Collect a discrete (for VOCs) and composite samples (for other analytes) of each off-site fill material at the frequency indicated.

    c. If testing results indicate that a proposed off-site fill material does not comply with the Contract Documents, the Contractor shall identify and propose a new off-site source of the specified material in accordance with this Section. Costs for retesting of rejected materials and installed Work shall be the Contractor's responsibility.

    d. Do not ship off-site fill materials to the Site until proposed materials, sources, and suppliers are accepted by the Engineer.

C. Regulatory Requirements

1. Obtain required permits and approvals for the excavation and fill Work, including work permits from right-of-way owners.

1.6 SUBMITTALS

A. The Contractor shall submit the following in accordance with Section 01 33 00 – Submittal Procedures to allow for a minimum period of 30 days of EPA review, and any EPA comments/concerns shall be addressed before proceeding with the associated Work.

1. Capping Plan shall include (but not be limited to) the following information:

a. Submit an acceptable plan for cap construction and related work

1) Proposed material sources and supplier information along with material characterization reports (see Part 1.6.A.2 of this Section, below). Verify that materials are available in sufficient quantities to complete the Work.

2) Vendor product data and technical specifications for the selected ACB mat, including a summary of recommended critical shear stresses and velocities for the mat, testing and analysis per ASTM D7277 and D7276, results of ASTM D7276 regression analysis, and appropriate design details including weight, percentage of open areas, and sizes.

3) Describe the means, methods, and verification procedures to place ACB mats within the design tolerances for spacing between individual mats and for spacing near bulkhead edges.

4) Describe the means, methods, and verification procedures to place gravel within the voids and gaps of the ACB mats to the specified design tolerances.

5) Describe how the Class G structural concrete for underwater applications will be placed in accordance with NYSDOT Specification 555-3.05 including the source of concrete and equipment necessary for installation. Describe the means and methods for verification of placement within the design tolerances specified in this Section and on the Construction Drawings.

6) Describe field procedures for mixing reactive material batches to achieve reactive material batch mass per unit volumes and pre-installation homogeneity as specified in this Section and on the Construction Drawings.

7) Describe the location of a Demonstration to evaluate the pre-installation and post-installation quality control (QC) requirements as specified in this Section. Propose the timing of the demonstration application with the final schedule to be agreed upon with the Engineer.

a) Demonstration Area shall be a minimum of 50 lineal feet long across the full width of the Turning Basin.

8) Propose a method to collect in situ samples (see Part 3.5 of this Section, below), such as using box coring or catch pans, minimum 6-inch width and 12-inch depth, for both visual inspection and laboratory testing. The sampler shall be constructed of clear material to permit visual observation of the GAC and Sand Layer.

9) Describe placement methods and equipment and provide expected production rates (area per unit time) for each capping layer.

10) Describe the sequence of placement for each capping layer and coordination with dredging and other project components (e.g., survey).

11) Describe placement sequence and means and methods to limit disturbance (i.e., movement, erosion, and suspension) of capping layers and sediment during and after placement of individual layers.

12) Describe the means and methods of preventing cross-contamination of cap materials during adjacent construction.

13) Describe means and methods for measuring progress and verifying areal coverage and thickness of each capping layer.

b. During construction, submit any proposed significant changes to operating procedures or equipment, such as use of an entirely different cap placement technology, to the Responsible Parties and the Engineer for review and approval prior to implementation.

c. During construction, submit updates to the Capping Plan as requested by the Engineer or, as necessary, to account for different methods, procedures, or conditions to those presented in the approved Capping Plan.

2. Borrow Source Characterization Report

a. At least four weeks prior to import of materials to the Site, submit a Borrow Source Characterization Report for each source and each material type specified in Part 2 of this Section. The Borrow Source Characterization Reports shall include, at a minimum following:

1) The material source, including name, address, and contact information.

2) A certification letter from the borrow source owner or operator certifying that the source is not from an industrial site or suspected to have been modified by the addition of manufactured chemicals and that the material does not contain oil or hazardous material as supported by test data to be provided with the certification letter. Also include a copy of applicable current permits (e.g., NYSDEC mining permit) and approvals (e.g., NYSDOT quarry certification).

3) The results of QA/QC testing, as specified in Part 1.5.B.5 of this Section, for all materials proposed from each source.

3. Reactive Material Certification for each manufacturer or supplier as follows:

a. Provide supplier QA/QC certificates for OC and GAC, including certification of virgin material.

b. Request instructions on handling and storage for OC and GAC from the manufacturer or supplier.

c. Provide product data to demonstrate compliance with requirements specified herein, including physical and chemical characteristics of the OC and GAC.

4. ACB Certification as follows:

a. Provide manufacturer test data showing that the concrete products were manufactured within 24 months prior to anticipated placement date per ASTM D6684.

b. Provide compressive strength, water absorption, and unit weight (density) sampling methodologies and results in accordance with ASTM D6684.

5. Concrete Certification as follows:

a. Provide a report from the concrete supplier verifying the structural concrete for underwater applications is Class G in accordance with NYSDOT specifications.

B. Informational Submittals

1. Submit the following:

a. Fill material samples for each source and each material type specified in Part 2 of this Section.

b. A copy of the delivery tickets for each load of off-site material delivered to the Site. Each delivery ticket shall indicate the supplier name and source address, project name, contract number, date, material type, NYSDOT item number when applicable, and weight delivered, as measured on certified scales at the source location.

c. A material removal status summary in daily progress reports in accordance with Section 01 32 01 – Construction Progress Documentation.

d. Test reports for field QC testing performed in accordance with Part 3.5 of this Section, including:

1) Treatment Layer Mixing QC field test results as specified in this Section.

2) Treatment Layer Placement post-installation in situ QC testing results as specified in this Section; and

3) A thickness verification report for all cap layers, with the exception of the structural concrete to be placed underwater and gravel placed within the voids of the ACB mats.

e. Survey results and associated calculations in accordance with Section 01 71 23.16 – Construction Surveying.

PART 2: PRODUCTS

2.1 GENERAL

A. The Contractor shall procure the capping and backfilling products specified in this Section.

2.2 EQUIPMENT

A. Equipment of various sizes, types, and configurations shall be provided by the Contractor as necessary to maximize effectiveness based on the different cap materials to be installed.

B. The Contractor shall provide appropriate protection of materials from weather and other environmental stressors until use (e.g., spills).

2.3 RESTORATION MATERIALS

A. Sand Planting Soil

1. Sand planting soil for the intertidal vegetative shelf shall meet the specifications provided in Section 32 91 13 – Planting Soils.

B. Sand

1. Sand used for the following purposes shall meet the requirements of NYSDOT 733-15 for source, gradation, durability, and pH:

   a. Sand Backfill;

   b. Sand Leveling Layer;

   c. Sand portion of the Treatment Layer;

   d. Isolation and Filter Layer; and

   e. Sand for Intertidal Vegetative Shelf.

2. Material shall be free of foreign, recycled, or reprocessed materials. The presence of such materials will be cause for rejection and returned to the supplier.

C. Gravel

1. Gravel is to be used for the following purposes:

   a. Gravel for Ecological Habitat Layer.

2. Furnish material consisting of crushed stone or gravel, free of soft, non-durable particles, organic material, and thin or elongated particles having a gradation for AASHTO #67, as presented in Table 35 43 00-A below.

Table 1
Gradation Requirements for Gravel

U.S. Sieve Size	Percentage by Weight Passing Sieve
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

D. OC

1. Furnish virgin CETCO Organoclay®, PM-200. OC shall be suitably packaged to isolate the material from the environment to preserve its efficacy, and to avoid loss of material in transit and/or for the duration of storage.

2. The Contractor shall conduct a visual inspection of OC upon receipt to identify any damage to packaging. The Contractor shall further inspect product received in damaged packaging to verify product integrity.

3. Prior to shipment, the vendor shall label each package with the following information:

   a. Manufacturer name;

   b. Manufacturer address;

   c. Product code and lot number; and

   d. Certification documentation.

E. GAC

1. Furnish virgin Calgon Carbon Filtrsorb® 400 GAC. GAC shall be suitably packaged by the vendor to isolate the material from the environment in order to preserve its efficacy for the duration of shipment and storage.
2. The Contractor shall conduct a visual inspection of GAC upon receipt to identify any damage to packaging. The Contractor shall further inspect product received in damaged packaging to verify product integrity.
3. Prior to shipment, the vendor shall label each package with the following information:
    a. Manufacturer name;
    b. Manufacturer address;
    c. Product code and lot number; and
    d. Certification documentation.

F. ACB Mats

1. Furnish ACB mats to meet the required properties summarized as follows.
    a. ACB mats shall be consistent with the ACBs employed at the 4th Street Turning Basin.
    b. ACB mats shall be a matrix of interconnected concrete block units connected by geometric interlock and/or cables.
    c. ACB mats shall have a thickness of 6 inches plus or minus 0.5 inches.
    d. The cementitious materials of the ACB mats shall conform to ASTM D6684.
    e. The aggregates shall conform to ASTM D6684.
    f. Revetment cables and fittings shall be designed in accordance with ASTM D6684 and provide a minimum factor of safety of 5.0 for lifting and handling. Physical requirements for ACB mats shall conform to Table 1 from ASTM D6664.
    g. The minimum critical shear stress and critical velocity based on full-scale laboratory testing and recommended by the manufacturer shall be at least 8 pounds per square foot (psf) and 14 feet per second (fps), respectively, on both a flat slope and on a three horizontal to one vertical slope (3H:1V). The test and analysis of the values shall be in accordance with ASTM D7277 and ASTM D7276.
    h. The percent of open area of the ACB mat shall be between 15% and 25%.
    i. The maximum spacing between individual ACB mats shall be 2 inches.
    j. The spacing from the outside edge of ACB mats to the outside edge of bulkheads and to the limits of dredging shall be one to two feet. In confined locations, the Contractor may request a greater allowance. The request shall be written and provided to the Engineer five business days prior to placement.
2. Upon receipt, conduct a visual inspection of ACB mats to identify any damage to the product prior to placement.
    a. Products with cracks exceeding 0.25 inches in width or 1.0 inches in depth shall be rejected.

b. Products which are chipped, where chipping results in a loss exceeding 10% of the average weight of a concrete unit, shall be rejected.

G. Structural Concrete for Underwater Applications

1. Shall consist of NYSDOT Class G Concrete. The concrete shall not contain fly ash. The structural concrete shall have a thickness of 6 inches plus or minus 2 inches and generally be flush with the top of the ACB mats.

PART 3: EXECUTION

3.1 GENERAL

A. Provide the Engineer with sufficient notice and with means to examine areas and conditions under which the cap construction Work will be performed. The Engineer will advise the Contractor in writing when the Engineer is aware of conditions that may be detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. If, at any point during the Work, the turbidity monitoring data indicates turbidity levels above the turbidity action level, or if distinct turbidity plumes are visible, the Contractor will implement response actions as required by Section 01 57 19 – Temporary Environmental Controls.

C. maintain stockpile areas free of water, debris, and foreign material during storage, handling, and placement of materials. The Contractor shall also provide stormwater protection of stockpiled material in accordance with the BMPs described in the approved Cap Construction Work Plan.

D. An appropriate mixing method, using equipment designed for material blending, shall be used to achieve a uniform thickness and mix of reactive material with sand. Mixing with excavation equipment, specifically an excavator bucket, will not be permitted.

3.2 SEQUENCING OF WORK

A. Sequence the placement of cap layers to minimize cross-contamination, limit project disruptions, and preserve the project schedule;

B. Conduct a post-removal survey in accordance with Section 01 71 23.16 – Construction Surveying following completion of material removal and prior to fill placement;

C. If material removal equipment is to be used for restoration, conduct equipment decontamination prior to using for placement of fill, in accordance with Section 02 51 00 – Decontamination;

D. Place sand backfill to prepare (level) the surface for capping;

E. Conduct cap construction and fill placement as discussed in Part 3.3 of this Section. For the Treatment Layer, confirm in situ demonstration testing results for the Demonstration Area (see Part 3.5 of this Section) prior to full-scale placement of the Treatment Layer;

F. Conduct a post-restoration survey in accordance with Section 01 71 23.16 – Construction Surveying following completion of restoration; and

G. Conduct equipment decontamination prior to demobilization in accordance with Section 02 51 00 – Decontamination.

3.3 FILL

A. Fill materials shall not be placed until all material removal activities have been completed and a post-removal survey has been completed and reviewed by the Engineer in accordance with Part 3.2 of this Section.

B. Provide all fill required for the finished grades as shown and as specified in this Section.

C. Fill that includes organic materials or other unacceptable material shall be removed and replaced with approved fill material in accordance with the Contract Documents.

D. The GAC and Sand Treatment Layer shall be pre-wetted prior to placement to minimize loss of carbon.

E. The Cap Treatment Layer shall be placed in a manner that minimizes the separation of reactive material from the sand.

F. Cap layers shall be placed in a manner which minimizes resuspension of sediment and mixing of sediment with capping materials.

G. Cap layers shall be placed in a manner which minimizes disturbance of and mixing with previously placed cap materials.

H. Intertidal vegetative shelf layers shall be placed in a manner which minimizes disturbance of and mixing with previously placed cap materials.

I. Materials shall be placed according to the dimensions specified on the Construction Drawings and with the following tolerances:

1. The horizontal tolerance for placement for the Sand Leveling Layer, Treatment Layers, and Isolation and Filter Layer shall be plus or minus 0.25 feet from the western limit of the cap as presented on the Construction Drawings. The materials shall extend to the neatline to the north, south, and east of the First Street Turning Basin.

2. The intertidal vegetative shelf materials shall extend to the neatline to the bulkheads that defined the area.

3. The horizontal tolerance for placement of the armor layer and gravel placed within the voids of the ACB mats shall be plus or minus 2 feet from the western limit of the cap, as presented on the Construction Drawings. The materials shall extent to within 1 to 2 feet from the front edge of the bulkheads as presented on the Construction Drawings.

4. OC content of the OC and Sand layer shall be no less than 25% by dry weight based on the pre-installation QC criteria specified in this Section.

5. GAC content of each Cap Type GAC and Sand Layer shall be, on average, within minus 3% by dry weight from required criteria specified on Construction Drawings based on the pre- and post-installation /QC criteria specified in this Section.

6. Vertical tolerance for each layer of the basin cap shall be as follows in Table 2.

Table 2
Vertical Tolerance for Basin Cap Layers

Layer	Minus (inches)	Plus (inches)
Sand Leveling Layer	3	3
OC and Sand Layer	0	2
GAC and Sand Layer (Type 1)	0	2
GAC and Sand Layer (Type 2 and 3)	0	2
Isolation and Filter Layer	2	2

a. No more than 10% of the area shall be outside the tolerance limits prescribed, unless otherwise specified or approved by the Responsible Parties and the Engineer.

7. Vertical tolerance for each layer of the intertidal vegetative shelf cap shall be as follows in Table 3.

Table 3
Vertical Tolerance for Intertidal Vegetative Shelf Cap Layers

Layer	Minus (inches)	Plus (inches)
Gravel	0	2
Sand	0	2
Topsoil	0	2

a. No more than 10% of the area shall be outside the tolerance limits prescribed, unless otherwise specified or approved by and the Engineer.

8. Gravel placed within the voids of the ACB mats (armor layer) shall be flush with the top of the ACB mats plus or minus 1 inch with a typical thickness of 6 inches.

9. Corrective measures must be completed on any layer prior to placement of the next successive material.

10. The Contractor will not be reimbursed for placement of materials beyond tolerances.

3.4 ARMOR LAYER MATERIALS

A. ACB mats shall be carefully placed to avoid damage and/or displacement of the underlying materials.

B. ACB mats shall be placed such that the completed top surface of the ACB mats meet the lines and grades shown on the Construction Drawings, within the tolerances noted above, unless otherwise directed by the and/or the Engineer.

C. ACB mats shall provide close contact with the underlying isolation and filter layer and limit disturbance during placement in accordance with the manufacturer's recommendations. Installation of the ACB mats shall be in accordance with the applicable requirements of ASTM D6884.

D. Tremie or pump the structural concrete for underwater placement in accordance with NYSDOT Specification 555-3.05(A) and 555-3.05(B)(1) or (2), including the source of concrete and equipment necessary for installation. The structural concrete shall be approximately level with the top of the ACB mats plus or minus 2 inches. Concrete shall only be placed in water when temperatures range from 32°F to 90°F.

E. Verify that the structural concrete is mixed adequately prior to placement and verify that the correct volume of material was placed.

3.5 FIELD QUALITY CONTROL

A. General

1. The Contractor shall notify the Engineer at least 72 hours in advance of scheduled testing. The Engineer may designate additional areas to be tested.

2. Submit test results, certified by testing laboratory (where applicable), to the Engineer within 24 hours of test completion.

B. Treatment Layer Mixing

1. For reactive materials mixed with sand, verify mix fractions by documenting weight of reactive material and sand in the mix for each batch of 100 tons.

2. Number each batch and calculate mix fractions of each batch to demonstrate that batches comply with the criteria specified herein.

3. Collect 3 grab samples from each batch and visually inspect and photo-document each batch for homogeneity of the reactive material and sand mixture.

4. For the mixing procedure to be accepted, the calculated mix fraction of reactive material in each sample shall achieve the design criteria listed in the Contract Documents and this Section, and the uniformity of the reactive material shall be approved by the Engineer.

C. Treatment Layer Placement Testing in Demonstration Area

1. Install the Treatment Layer across the Demonstration Area to test the Treatment Layer placement method:

a. Place sampler (proposed and approved in the Cap Construction Plan) on the OC and Sand layer prior to GAC and Sand material placement and remove after the GAC and Sand Layer is installed in the Demonstration Area.

b. Collect 5 in situ samples of the GAC and Sand Layer within the Demonstration Area from random locations selected by the Engineer.

c. The samples will be used to:

1) Measure GAC and Sand layer thickness.

2) Qualitatively (e.g., visually) evaluate the uniformity of the as-built mixing. The samples then will be homogenized and shipped to a third-party laboratory by the Engineer for loss on ignition testing to determine as-built GAC content.

2. If test results indicate that the as-built GAC and Sand Layer thickness and composition do not meet the design specifications detailed herein, the Contractor shall modify the installation method and perform an additional Demonstration Area (of equal size to the first), conducting in situ sampling requirements as specified above. The Contractor shall rework the areas represented by samples that are out of compliance by installing an additional thickness of GAC and Sand layer materials to obtain the desired dosage on a pound per square foot of active ingredient basis at no additional cost to the Responsible Parties. There will be no payment for stand-by time used while awaiting the results of testing for acceptance of Demonstration Areas or for rework of areas out of compliance.

3. When the results indicate that the as-built GAC and Sand layer thickness and composition in the Demonstration Area meet the design specifications, proceed with the installation method throughout the Site. No additional loss on ignition tests will be required.

4. Thickness Verification of Basin Cap Placement

    a. Conduct a hydrographic survey of the Sand Leveling Layer in accordance with Section 01 71 23.16 – Construction Surveying. The Contractor shall conduct the leveling layer survey to confirm the leveling layer has been placed to the specified thicknesses and coverage areas as presented on the Construction Drawings and in this Section.

    b. Following full-scale installation of each Treatment Layer, measure the thickness of each Treatment Layer by collecting samples on a triangular grid pattern using the method approved for collection of in situ samples from the Demonstration Area. Before proceeding to the next layer, correct any deficiency in thickness by adding additional Treatment Layer material to obtain the minimum thicknesses. The corrective measures shall be applied to the midpoint of a line between a failing sample location and the closest sampling point in compliance with thickness requirements.

    c. Conduct a hydrographic survey for the OC and Sand component of the Treatment Layer (first Treatment Layer survey) and for the GAC and Sand component of the Treatment Layer (second Treatment Layer survey) in accordance with 01 71 23.16 – Construction Surveying. The Contractor shall conduct a Treatment Layer survey after each individual layer is installed to verify that the treatment components of the cap have been placed to the specified thicknesses and areas presented on the Construction Drawings and in this Section. The average thickness of the Treatment Layer will be based on the average thickness of the in situ samples. The confirmation of the area of coverage of the two treatment layers, as presented on the Construction Drawings of the two treatment layers, will be based on their respective hydrographic surveys. The area of coverage for the OC and Sand component will be verified by comparing the first Treatment Layer survey with the Sand Leveling Layer survey. The area of coverage for the GAC and Sand component will be verified by comparing the second Treatment Layer survey with the first Treatment Layer survey.

    d. Conduct a hydrographic survey of the Isolation and Filter Layer in accordance with Section 01 71 23.16 – Construction Surveying. Conduct the Isolation and Filter Layer survey to confirm the Isolation and Filter Layer has been placed to the specified thicknesses and coverage areas as presented on the Construction Drawings and in this Section. The volume of the Isolation and Filter Layer will be calculated by comparing the Isolation and Filter Layer survey with the second Treatment Layer survey.

    e. Conduct a hydrographic survey to confirm placement of the ACB mats (i.e., the final cap survey). The calculated area of coverage of the ACB mats shall be confirmed with the final cap survey. The Contractor shall also maintain documentation of where ACB mats were placed to confirm placement in the areas presented on the Construction Drawings. The total area of the ACB mats will be based on the total area of the ACB mats installed.

    f. The ecological and habitat layer placed within the voids of the ACB mats shall be verified by the proposed means, methods, and verification procedures in the Cap Construction Work Plan.

g. Placement of the structural concrete for underwater applications shall be verified in these areas by probing as follows:

1) At every fifth interlock between the pipe piles and at each interior corner of the walls, probe within the cavity to determine the top elevation of the structural fill. If the structural concrete is more than 2 inches below the top of the ACB mats as indicated from the hydrographic survey, the Contractor shall place additional structural concrete underwater until the top of the structural fill is within 2 inches of the top of the ACB mats for the closest three pipe pile interlocks on both sides (total of seven interlocks) of the measured pipe pile cavity. Notes shall be maintained and submitted to the Engineer which verify the probing has occurred and meets the tolerances required.

D. Thickness Verification of Intertidal Vegetative Shelf Cap Placement

1. Conduct a traditional survey after placement of each layer in accordance with Section 01 71 23.16 – Construction Surveying to verify that the treatment components of the cap have been placed to the specified thicknesses and areas presented on the Construction Drawings and in this Section. The volume of the Gravel Layer will be calculated by comparing Low Permeability Clay Mat survey with the Gravel Layer survey. The volume of the Sand Layer will be calculated by comparing Gravel Layer survey with the Sand Layer survey. The volume of the Topsoil Layer will be calculated by comparing Sand Layer survey with the Topsoil Layer survey.

2. Before proceeding to the next layer, correct any deficiency in thickness by adding additional material to obtain the minimum thicknesses.

[END OF SECTION]

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 44 08 40

WATER TREATMENT SYSTEM REQUIREMENTS

PART 1: GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall provide all labor, materials, tools, equipment, and incidentals to design, fabricate, deliver, erect, start-up, test, operate, maintain, monitor and report on an on-site water treatment system (WTS) to treat dredge spoil derived water. The Contractor, in executing the Work, shall be responsible for sizing the WTS based on expected excavation production rates, water volumes, and stormwater accumulation in dredge scow, secondary containment, process equipment, etc. Equipment decontamination and washdown waters shall also be treated. Treated water effluent shall meet the treatment objectives specified herein for discharge back to the Turning Basin.

2. It is not the intent of this Section to specify the details of the design, fabrication, construction, and operation of the WTS. It shall be the Contractor's responsibility to furnish and erect a fully operational WTS that meets the specifications of this Section.

3. The WTS shall be furnished complete with all equipment and necessary parts, controls and incidentals required for successful operation. Installation shall be in complete conformance with these Technical Specifications and the instructions and recommendations of the equipment manufacturers.

4. The Contractor shall be responsible for the operation of the WTS in a manner that accomplishes the required treatment standards in accordance with all Federal, State and local laws. The Contractor will be responsible for completing any and all Federal, State and local permitting and pilot testing required to obtain a United State Environmental Protection Agency (EPA) equivalency permit for discharge to the Turning Basin. The Contractor shall also be required to monitor system performance and maintain operating records of system performance that adequately document the required treatment.

5. The Contractor shall be responsible for maintaining any and all dredging equipment and incidentals at the Gowanus Canal [Remediation Target Area (RTA) 1] in a manner which does not constrain or otherwise inhibit Canal navigation of small boats, tugs and barges.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites

C. Section 01 51 00 – Temporary Utilities

D. Section 01 57 19 – Temporary Environmental Controls

E. Section 02 51 19 – Excavated Material and Waste Management

1.3 REFERENCES

A. Title 6 New York Codes, Rules and Regulations (6 NYCRR Part 750) State Pollutant Discharge Elimination System (SPDES) Permits;

B. American Water Work Association (AWWA) D103 Standard for Potable Water Storage Tanks;

C. New York City Fire Code Chapter 27 – Hazardous Materials;

D. Rules of the City of New York (RCNY) Title 15, Chapter 28: Citywide Construction Noise Mitigation;

E. New York Administrative Code Title 24, Chapter 1: Environmental Protection and Utilities – Air Pollution Control;

F. National Electric Code (NEC);

G. Hydraulic Institute, Hydraulic Institute Standards, 14th ed., Hydraulic Institute, Cleveland, OH;

H. AWWA Standard for Granular Filter Material, American National Standards Institute (ANSI)/AWWA B100-01;

I. AWWA B604 Standard for Granular Activated Carbon;

J. American Society for Testing and Materials (ASTM) D1125-14 Standard Test Methods or Electrical Conductivity and Resistivity of Water;

K. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;

L. RTA1 65% Remedial Design for the Gowanus Canal;

M. New York State Department of Environmental Conservation (NYSDEC) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, TOGS 1.1.1 June 1998;

N. 100% Design Report, Excavation and Capping of the Filled First Street Turning Basin, Gowanus Canal, Brooklyn, New York. AKRF-KSE JV, May 2018.

1.4 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval by the Engineer and EPA in accordance with Section 01 33 00 – Submittal Procedures. Plans shall be submitted to allow for a minimum of 30 days of EPA review, and any EPA comments/concerns shall be addressed prior to proceeding with the associated work.

1. Preconstruction Submittals:

a. Engineering Design Report;

b. Water Treatment System Plan;

c. Treatment Process Equipment List;

d. Civil and Mechanical Drawings;

e. Process and Electrical Drawings;

f. Water Treatment System Start-up Plan; and

g. Permit Applications and Associated Submittals

2. Test Reports:

a. Wastewater Treatment Service Reports and Records.

3. Operation and Maintenance Data:

    a. Operation and Maintenance (O&M) Plan; and

    b. System Shut-down and Decommissioning (SSD) Plan

    c. RTA1 Dredge Equipment Staging and Canal Navigation Plan

B. Engineering Design Report

1. The Contractor shall submit an Engineering Design Report that outlines the basis of the WTS design, including design calculations, where applicable, for all components of the WTS, including, but not limited to: selection and sizing of all process equipment [e.g., storage tank, settling tank(s), clarifier, chemical feed systems, sludge handling equipment, bag filters, granular activated carbon (GAC) beds and media, pipe sizes and materials]; a preliminary process flow diagram (PFD); tank foundations; secondary containment; a list of utility requirements; effluent pipeline discharge components; pipeline transition components (e.g. connection, anchoring, tidal flexibility/adjustment for landside to scow transition); and a description of the process control system including, but not limited to: a) how the pump stations will be constructed, monitored and controlled or otherwise storage and treatment equalized to address the range of treatment flows associated with dredge water generation from anticipated excavation and dredge production rates, b) a list of all primary and secondary alarms, and c) how the alarms will be addressed.

2. The Contractor shall submit and ensure that all design calculations were performed by, or under the supervision of, an appropriate New York-licensed Professional Engineer (NYPE). The Engineering Design Report shall be signed and sealed by a NYPE.

C. Water Treatment System Plan

1. Prior to construction of the WTS, the Contractor shall submit a Water Treatment System Plan, which shall include a Design and Treatment System Start-up Plan. The Contractor shall: a) be responsible for the complete preparation, and submittal, of all applicable Plan components; b) ensure that all plans, submittals, and Engineering Design Reports are prepared in accordance with all applicable Federal, State, and local requirements; c) ensure all applicable submittals are signed and sealed by an appropriate NYPE; d) ensure that all applicable inspections and approvals are performed by an appropriate NYPE; and e) provide all submittals (e.g., WTS Plan, O&M Plan, etc.) to the Engineer for review and approval by the Engineer and EPA. The WTS Plan shall provide sufficient detail to construct and implement all aspects of the WTS.

D. Treatment Process Equipment List

1. The Contractor shall submit a complete list of equipment and materials to be used at the WTS. The Contractor shall provide shop drawings and other vendor information (e.g., manufacturer literature, model number, size, dimensions, design capacity, utility requirements, weight, materials of construction, installation and operational requirements), as applicable, for all proposed equipment including but not limited to:

    a. Settling Tank*;

    b. Equalization/Storage Tank*;

    c. Oil Water Separator;

    d. Non-aqueous phase liquid (NAPL) Storage Tank;

e. Chemical Dosing/Rapid Mixing Vessel ;

f. Clarifier;

g. Bag Filter Units;

h. GAC Vessels and media;

i. Backwash/Effluent Storage Tank;

j. Piping and Hoses (i.e., influent, effluent, process, discharge components);

k. Pumps;

l. Mixers;

m. Process instrumentation and control devices; and

n. Sludge handling equipment.

*Note: If a reduction in the treatment system footprint is necessary, the Contractor may propose combining the Equalization Tank and Settling Tank into a single weir Settling Tank or otherwise Settling Tank capacity may be included in calculations for total full day water storage capacity.

E. Civil and Mechanical Drawings

1. The Contractor shall submit civil and mechanical drawings that include sufficient details to install all the pipelines, the treatment system components, the NAPL and backwash storage tanks, the equalization/storage tank(s), settling tank, foundations, and the secondary containment berms. The civil and mechanical drawings shall include: applicable equipment layout and orientation on the Site plan; influent and effluent pipeline supports and/or below grade embedment; equipment installation details; the proposed anchorage of equipment and appurtenances; equipment relationship to other parts of the Work including clearances for maintenance and operation; secondary containment berms; discharge pipe and components; installation details of the pipe influent and sludge return discharge crossing bulkhead onto scows; treated effluent discharge to the Turning Basin; and construction notes (e.g., influent and effluent pipeline jacketing and heat tracing; specific pipeline excavation and backfilling procedures if influent or effluent piping is to be buried; requirements to safely construct the WTS in accordance with all applicable Federal, State, and local requirements).

F. Process and Electrical Drawings

1. The Contractor shall submit process drawings that provide sufficient details to monitor, operate, and control the WTS. The Contractor shall submit: a) a PFD that schematic, step-by-step flow chart including all major components of the wastewater treatment process from entrance into the system to exit out of the system, and b) a Piping and Instrumentation Drawings (P&ID) showing all major pieces of process equipment with controls. The P&ID shall provide piping, instrumentation, control, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit.

2. The Contractor shall submit electrical drawings that provide sufficient details to implement the electrical system for the WTS in accordance with all applicable Federal, State, and local requirements and codes. Depending on the level of automation, the drawings shall provide details associated with: a) the power feed(s) from the utility transformer to the Motor Control Center (MCC) or individual treatment system pumps and motors and from the

Main Control Panel (MCP) to the MCC or the individual treatment system pumps, b) MCC and MCP details, and/or c) a conduit and wiring schedule for all conduit and wiring from the MCC and MCP to the process equipment, the process instrumentation, and all other electrical devices.

G. Water Treatment System Start-up Plan

1. At a minimum, prior to initial system start-up, the Contractor shall: a) demonstrate that all pipelines, tanks, and other system components have been successfully pressure tested, and b) prepare and implement a WTS Start-Up Plan to demonstrate the operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of all the WTS components. During the initial system start-up, the Contractor must provide the means and methods to: a) document proper, continuous operation of the treatment plant components, and b) ensure that no water will be discharged until it is sampled and determined to meet discharge criteria (thus, water treated during initial treatment system start-up will be temporarily stored on the Site pending receipt of analytical testing data and confirmation of compliance with treatment criteria prior to discharge to the Turning Basin). The Contractor is required to implement the initial WTS Start-up Plan, unless a waiver has been obtained from the Engineer.

H. Operations and Maintenance Plan

1. Prior to start-up, the Contractor shall submit a comprehensive, project-wide O&M Plan that shall describe the procedure for testing, operating and maintaining the WTS to accomplish the required treatment. The O&M Plan shall be consistent with the Project Schedule. The O&M Plan shall include, at a minimum, the following:

   a. Procedures for hydraulic testing of equipment and tanks;

   b. Procedures for normal operation and normal operating parameters, including recording templates with expected operating parameter values;

   c. Procedures for treatment parameter monitoring, recording, reporting, and process sampling procedures;

   d. Procedures for emergency operation, including emergency communication protocols;

   e. Procedures for decanting waters from dredge spoil scow to equalization/storage tank(s);

   f. Procedures for handling and returning clarifier sludges to a dredge spoil scow;

   g. Procedures for backwashing carbon vessels;

   h. Procedures for cleaning solids and sediment accumulation in equalization, settling and oil-water separator vessels, and method of handling and returning solids and sediments to the dredge spoil scow;

   i. Procedures for servicing the oil water separator and handling of NAPL product;

   j. Procedures for decontamination and transferring decontamination and equipment wash water to the WTS;

   k. Procedures for maintaining clarifier, water and sludge pumps, chemical injection pumps, mixing motors and the replacement of failed or inoperable treatment equipment;

   l. Procedures for shutdown;

m. Procedures for decommissioning and removal of the WTS;

n. Procedures for general and preventive maintenance;

o. Procedures for disposal of treatment by-products, if required;

p. The staffing schedule;

q. A statement of treatment objectives and criteria; and

r. A spare parts list (e.g. water and sludge pumps, flowmeter(s), pressure gauges, check valves, chemical injection pumps). For equipment deemed critical to WTS operation where there is no parallel treatment (e.g. clarifier), if spare equipment and/or parts are not maintained on-site, the Contractor shall provide vendor documentation indicating equipment and/or parts are in-stock and available for 24-hour delivery to the Site.

I. RTA1 Equipment Staging and Canal Navigation Plan

1. Prior to start-up, the Contractor shall submit a plan depicting planned dredge equipment layout and moorings at RTA1. To accommodate both water decanting from and the return of sludge solids to moored scows, it is anticipated that the Contractor will use a Flexifloat or similar platform ballast system that could be tailored to the dimensional needs of the project as a temporary fixture within the Canal that does not present a navigation obstacle.

2. Contractor will submit a plan that does not constrain or otherwise inhibit the movement of goods and/or the navigation of small boats, tugs and barges.

1.5 HEALTH AND SAFETY REQUIREMENTS

A. The Contractor shall comply with environmental health and safety/training requirements in accordance with the approved Health and Safety Plan and Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

PART 2: PRODUCTS

2.1 GENERAL

A. A process flow diagram for the WTS is provided in Figure WTS-1, and a Summary List of Process Equipment is included in Table 1 of Attachment A of this Section. The WTS shall, at a minimum, consist of the following components.

2.2 PROCESS INSTRUMENTATION AND CONTROL SYSTEM

A. The Contractor shall evaluate and select a treatment system control method commensurate with the anticipated hours of operator staffing and the degree of system component monitoring required: manual, semi-automatic, automatic. The degree of instrumentation and control shall be in accordance with the minimum requirements for equipment operation indicated in the manufacturer's specifications. Given the nature of dredge spoil water collection and decanting from a scow, it is anticipated that batch treatment of dredge waters will be performed. The Contractor may consider process control automation requirements to support an 8-hour operator work day without overnight, weekend or otherwise unsupervised water treatment unless otherwise directed by the Engineer.

1. The Contractor shall provide MCP, either skid mounted or fabricated, to house, at a minimum, system pump interlocks and motor controls.

2. The Contractor shall provide, at a minimum, automation for treatment flow rate, chemical feed rate, pump rate control, filter control and continuous recording of effluent water quality for pH, turbidity, and conductivity. High-high level controls and alarms shall be interlocked to pump flow controls. The Contractor shall provide for the shutdown of the treatment system for high-high level alarms and for chemical storage low-low level alarms.

3. The Contractor shall provide measurement devices that measure the water level, pressure, flow rate, turbidity, pH, conductivity, and polymer/chemical dosages as follows:

   a. Flow meters shall be provided to measure flow rates in gallons-per-minute (gpm) within the range of anticipated treatment flows. Flowmeters shall include a totalizer.

   b. Nephelometric turbidimeters shall be provided. An air bubble trap shall be installed in the sample line upstream of the turbidity meter to prevent a false high reading of water that contains air bubbles.

   c. pH meters shall be composed of three chemically resistant electrodes comprised of: a pH sensing electrode, a reference electrode, and a temperature compensating electrode. These electrodes shall be mounted in a chamber and installed in the sample line or submerged in the tank. The pH meter shall have a pH range of 0 to 14.0 standard units (s.u.) with a minimum resolution of 0.1 s.u.

   d. Conductivity meter. An in-line conductivity meter with a minimum resolution of 5% of the measured value shall be provided. Conductivity electrodes will be constructed of chemically resistant materials and shall conform to ASTM D1125 Standard Test Methods for Electrical Conductivity and Resistivity of Water.

   e. Automatic controllers shall be installed that check chemical/polymer dosage.

4. The Contractor shall provide the appropriate types of control modes, proportional control, cascade control, and ratio control for each application.

5. The Contractor shall maintain spare pH, turbidity, and conductivity meters on-site.

2.3 SECONDARY CONTAINMENT

A. The Contractor shall provide and install secondary containment for process treatment equipment, storage tanks and treatment chemicals.

   1. The Contractor shall provide secondary containment for WTS components in accordance with the requirements of the New York City Fire Code Chapter 27 – Hazardous Materials, and the requirements of 40 Code of Federal Regulations (CFR) 112.7 “General Requirements for Spill Prevention, Control, and Countermeasure Plans.”

   2. Secondary containment for outdoor storage areas shall be designed to contain a spill from the largest container plus the volume of a 24-hour rainfall from a 25-year storm.

2.4 PUMPS

A. The Contractor shall provide and install transfer pumps to transfer water and stormwater from dredge spoil scow, stormwater accumulation at secondary containment and decontamination or process equipment washdown waters. The transfer pumps shall be suitable for grit, sands and other solids transfer, and shall have sufficient total head capacity for pumping to process equipment elevations without loss of design flow capacity.

   1. All pumps used in the WTS shall conform to the applicable ANSI or ASTM standards.

2. The Contractor shall provide suitable types of noncorrosive pumps and materials, such as peristaltic pumps, Viton tubing or equivalent, for liquid chemical metering and injecting of treatment chemicals.

3. The Contractor shall provide proper types of pumps suitable for transferring water between treatment processes, per manufacturer's recommendations. Pump(s) for treatment through bag filter and GAC pressure vessels shall be sized to accommodate anticipated maximum treatment flow with sufficient total head capacity to overcome backpressure from fouling of bag filters and carbon media, and maintain design treatment flow in accordance with the maximum pressure rating of bag filter, GAC vessels, and process piping and fittings, so as to provide additional treatment operation duration in the event of delay in bag filter or GAC switchover or maintenance.

4. The Contractor shall provide appropriately sized pumps of sufficient flow and total head capacity for: backwashing GAC vessels, transfer of treatment sludges, return of treatment sludges back to dredge spoil scow for disposal, and discharge of treated water to the turning basin.

5. The Contractor shall provide pumps for transferring oil from the oil-water separator to the NAPL storage tank. The pumps for this application shall be capable of handling oily materials and grit.

6. Replacement pumps for critical treatment processes shall be maintained on-site and shall be identified and listed in O&M submittal spare parts list.

7. Diesel or gasoline fueled transfer pumps and the like shall be grounded to prevent static discharge during fueling operations.

2.5 PIPING AND HOSES

A. The Contractor shall provide and install piping and any hose materials such that they are compatible with the fluid they are carrying and shall resist corrosion, expansion and contraction. Sludge piping shall be provided to have the appropriate diameter and velocity to prevent clogging and shall be constructed of materials to resist abrasion and scour. All piping and any hoses shall conform to the applicable industry standards for the product which they are carrying.

1. Pipe sizes, joints, and schedules and any hose connections and materials shall meet the requirements of maximum treatment system design flows and anticipated operating pressures, as well as backflow pressures that may occur from fouled bag filters, GAC vessels, or clogged piping.

2. Piping supports, anchors, hangers and the like and their materials of construction shall conform to applicable industry standards and pipe manufacturer recommendations. For buried installation of piping, the Contractor shall consider pipe materials to resist overburden and traffic loads, and pipe manufacturer and industry standards for pipe bedding, backfill materials, and soil compaction.

3. The Contractor shall provide pipe and any hose related products per the manufacturer's recommendations, including but not limited to: fittings, couplings, fasteners, reducers, material transition pieces, manifolds, flexible and rigid tubing, riser tubing, dip tubes, hoses, and drop pipes.

4. Piping and/or any process hoses prone to freezing during winter treatment operations shall be heat-traced and insulated unless otherwise directed by the Engineer.

5. Fluids and/or sludge transport that may occur along the ground in traffic areas and where vehicular and equipment traffic may have cause to drive over piping shall be via steel temporary road ramps for liquids (e.g. Godwin or equivalent) rated for maximum anticipated traffic load and treatment flow capacity. Unless otherwise directed by the Engineer, wooden or asphalt berms at piping sides for traffic ramps shall not be accepted.

6. Lay flat hose shall not be used for any portions of treatment unless otherwise approved by the Engineer.

7. Unless otherwise accepted by the Engineer, use of schedule 40 PVC piping or fittings for the high flow and pressure portions of dredge water treatment conveyance or sludge and solids handling shall not be permitted.

2.6 VALVES

A. The Contractor shall provide and install valves to isolate process treatment equipment and facilitate the replacement of pumps, mixers, clarifier, bag filter and GAC vessels, and to throttle treatment process flows.

1. The Contractor shall provide valves suitable for installation in the process pipeline of materials being transported (e.g. knife valves for high solid liquids) and that are capable of handling the full range of anticipated treatment flows. Valves shall resist corrosion, abrasion, be rated for the maximum anticipated system operating pressure and conform to manufacturer's specifications and applicable ANSI/AWWA standards. Valve seals, seats and/or packings shall be compatible to the chemicals they will be controlling.

2. Valves shall be installed and/or manifold fabricated to control all functions of the GAC vessels backwashing and rinsing and side-stream filling of backwash/effluent storage tank.

2.7 TANKS

A. The Contractor shall provide and install, at a minimum, the following tanks to facilitate dredge water storage and treatment: a) Mixing Vessels for chemical addition (i.e., oxidant, coagulant, flocculant, and pH adjustment) to adjust waste water chemistry prior to clarification, b) a NAPL storage tank for the storage of non-aqueous phase liquids transferred from the oil-water separator, and c) a backwash/effluent storage tank to store treated water side-streamed from the treatment system for later backwash of GAC vessels and cleaning of treatment equipment.

1. The Contractor shall provide tanks that have working capacities sized to the treatment process. Equalization/storage tanks shall be sized for one full day of dredge water storage.

2. Tanks will be certified clean, serviceable and adequate for the intended purpose. The Engineer reserves the right to inspect and approve/reject the use of tanks brought to the Site. If the Engineer determines that a tank is not acceptable for its intended service use or is otherwise not clean and requires replacement, the cost to demobilize and mobilize a new tank must be paid for by the Contractor.

3. Tanks shall be constructed of a material that is compatible with the material being contained. Polyethylene or similar plastic construction tanks shall be resistant to ultraviolet degradation. Double walled storage tanks shall be sized with containment for 110% capacity of the primary tank.

4. Tanks shall be closed-top or equipped with removable covers/coverings. Tanks shall be filled and drained via through-the-wall or drain ports and fittings.

5. Steel tanks shall be free from heavy rust and corrosion. Steel tanks exhibiting pitting, or bubbling of paint and signs of underlying corrosion may be rejected by the Engineer.

6. Tanks shall be equipped with control devices to prevent overfilling and overflowing. Each tank shall have a dedicated fill line.

7. Tanks shall have standard sized fittings and bolt patterns, sized to accommodate gravity flow of maximum anticipated process treatment flow for solids settling and oil-water separation. Fittings for suction and drainage will be located at various sections of the tank. Nozzles attached to the tanks below the full level of the tanks shall be two-flanged style. Gaskets shall be resistant and chemically compatible with petroleum and chlorinated compounds.

8. Tanks for chemical mixing or storage shall be coated with corrosion-resistant material and shall be capable of withstanding cleaning temperatures of at least 90 ºC (200 ºF).

9. Tank vents shall comply with health and safety requirements for normal venting of atmospheric tanks. Vent devices shall be designed in accordance with industry standards to provide adequate relief in the event of tank content combustion. Appropriate caution or warning signs as prescribed by health and safety requirements shall be affixed to the tank in accordance with the approved Health and Safety Plan and Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

2.8 FLOW MEASUREMENT SYSTEMS

A. The Contractor shall provide and install, at a minimum, flow meters to measure dredge water influent flow and treated effluent flow in units of gallons-per-minute (gpm) with total gallons indicated on totalizer.

1. The Contractor shall provide a non-mechanical (e.g., electromagnetic, ultrasonic) flow measurement system to measure the volume of dredge water influent flow in units of gpm in accordance with the manufacturer's written instructions and industry standards. The Contractor shall furnish manufacturer's product data, test reports, and material certifications.

2. The Contractor may utilize a mechanical turbine flow measurement system to measure volume of dredge water effluent flow in units of gpm in accordance with the manufacturer's written instructions and industry standards. The Contractor shall furnish manufacturer's product data, test reports, and material certifications.

3. The influent and effluent flow measurement systems shall be capable of operating continuously in outdoor conditions between the ambient temperatures of -10º to 50º C (14 ºF to 122 ºF) and between 0 to 95% relative humidity. The influent flow measurement system shall be capable of handling suspended solids in the liquid without affecting the accuracy of the system. Both influent and effluent flow measurement systems shall be constructed of corrosion resistant materials.

4. The influent and effluent flow measurement systems shall display instantaneous flow rate and shall include a flow totalizer.

5. The flow measurement systems shall have a +/- 2% accuracy over the complete operating range indicated in these Technical Specifications.

6. The flow measurement systems shall have factory wet calibration certificates stating the meter's serial number, calibration date, time, and accuracy of the meter.

2.9 FLOW EQUALIZATION/STORAGE/SETTLING TANKS AND OIL WATER SEPARATOR

A. The Contractor shall provide and install the following treatment and/or storage tanks: a) an Equalization/Storage Tank(s) to contain one full day's volume of dredge water and of sufficient capacity to facilitate continuous batch treatment of dredge waters at design treatment flow rates; b) a Solids Settling Tank(s) for primary settling of heavy soil fractions of solids, sands, fines and grits transferred from the Equalization/Storage Tank; and c) an Oil Water Separator (OWS) for free oil (hydrocarbon and other petroleum product) and settleable solids and particulate collection.

1. The Contractor shall provide flow Equalization/Storage Tank(s) as follows:

   a. Equalization/Storage Tank(s) shall be sized to hold one full day's volume of dredge water associated with maximum anticipated dredge spoil production rate;

   b. Equalization/Storage Tank(s) Tanks shall be serviceable and provide access to enable cleaning and maintenance; and

   c. Tanks shall be equipped with the means to measure and observe liquid levels and shall contain high-high level alarms interlocked to shutdown process treatment pumps in the event of overfill or overflow.

2. The Contractor shall provide a Settling Tank as follows:

   a. Settling Tank shall be serviceable and provide access to enable cleaning and maintenance and the removal of solids and sludges during operation;

   b. Settling Tank inlets and outlets for all basin compartments shall have the means to control flow via external valves, adjustable weirs or plates, or other flow control devices. Tanks shall be equipped with the means to measure and observe liquid levels and shall contain high-high level alarms interlocked to shutdown process treatment pumps in the event of overfill or overflow; and

   ** ALTERNATE I: The Contractor shall have the option to include in the WTS design the combining of the Equalization Tank and Settling Tank to reduce the treatment system footprint or to otherwise utilize Settling Tank capacity combined with Equalization Storage Tank capacity for full day water storage calculations.

3. The OWS shall be a coalescing interceptor designed to remove motor oils, fuel oils, hydraulic fluids, bunker c, dense non-aqueous phase liquid (DNAPL), light non-aqueous phase liquid (LNAPL) and other hydrocarbon derivatives. The OWS shall be pre-engineered and pre-constructed with the following features:

   a. Parallel plate interceptor with overflow weir or influent diffuser treating to 50 milligrams per liter (mg/L) or less of 60-micron oil droplet size;

   b. Capacity to treat the maximum calculated daily dredge water volume;

   c. Carbon steel construction with adjustable weir plates and an oil reservoir for temporary storage of skimmed oils;

   d. Chemically resistant epoxy coating;

   e. Inlet and outlet shall have suitably sized National Pipe Thread (NPT) or flanged connections;

   f. Vent and waste oil draw-off shall have suitably sized NPT or flanged fittings;

g. The sludge baffle shall retain settleable solids and sediment and prevent them from entering the separation chamber;

h. An oil sight glass;

i. Coalescing media shall be of the type and quantity recommended in the manufacturer's specifications for optimum treatment performance; and

j. Immersion heaters for freeze protection if the unit is operated when the ambient temperature will be below freezing.

2.10 POLYMER FEED AND PH ADJUSTMENT SYSTEMS

A. The Contractor shall provide and install a Polymer and pH Adjustment feed system (as needed) to induce suspended colloidal particulate and dissolved cation metal coagulation, flocculation and settling from decant influent dredge water prior to process treatment through bag filter filtration and GAC media vessels.

1. The Contractor shall provide a polymer feed system. The components and appurtenances shall include, but not be limited to, the following.

a. Feeder. The feeder materials shall be compatible with the chemicals. The feeder type shall consist of metering pumps, a magnetic flow meter, or a rotameter. The feeder shall be provided to cover the range for dosage setting and flow pacing. Automatic or manual control shall be provided for dosage setting and flow pacing. Feeder accuracy shall be ±1.0%.

b. Storage. Storage shall be made of noncorrosive material; a steel tank may be used if it has a protective lining. The capacity shall be 15 days of storage, based on the maximum dosage and average daily flow rate. A content indicator shall be provided for each tank.

c. Feed line. The feed line shall be made of noncorrosive materials such as PVC or type 316 stainless steel, and conform to applicable industry standards. A removable top channel with gravity flow is often used for lime slurry in dry feed system.

d. Diffuser. The Contractor shall select the proper type of diffuser depending on the type of chemical used. Types A (in-line) and B diffusers (in a tank inlet or in a channel) that are perforated-pipe diffusers are appropriate for non-scale-forming chemicals or polymer addition, and they shall be used if mixing is achieved solely by diffusion and not by means of positive flash mixing. Types A and B diffusers shall be avoided if the chemical has scale-forming characteristics and types C (in-line removable), D (in a tank inlet or in a structure), and E (gravity feed from a trough above water surface) diffusers shall be considered.

2. The Contractor shall select polymers/chemicals that are EPA-approved for drinking water use and approved for use in the State of New York. The maximum dosages shall conform with the aquatic criteria set by regulatory authorities.

3. The Contractor shall provide emergency spill kits around the polymer feed system to contain and dispose of the spilled material in accordance with requirements in this Section and Section 01 57 19 – Temporary Environmental Controls and Section 02 51 19 – Excavated Material and Waste Management.

4. In chemical storage areas, the Contractor shall provide: clear warning signs on chemical storage areas, eyewashes and safety showers, berms for secondary containments, and

adequate lighting and ventilations. All chemical storage tanks shall have tags labeling their contents, access ports, a fill line, drains, overflows, discharge valves, vents, and content indicators (such as a load cell or a differential pressure cell, or sonic-level indicators).

5. The Contractor shall use mixing devices with relatively low speeds, such as mechanical mixers at 400 revolutions per minute (rpm) or less, in order to reduce the potential for breaking the polymer chains.

2.11 LAMELLA CLARIFIER

A. The Contractor shall provide and install a Clarifier in addition to associated sludge handling and disposal equipment to remove settled colloidal particles, iron (Fe), manganese (Mn) and other cation metals from wastewater.

1. The clarifier units shall be designed as pre-fabricated commercial complete package units to integrate settling and flocculation. The inclined plates shall be National Sanitation Foundation (NSF)-approved and installed in tanks with either a hopper or a sludge thickening bottom.

2. The rapid mixing tanks shall have an appropriate design retention time. Design settling velocity shall not exceed 500 gallons per day per square foot. Design parameters must meet laminar flow conditions (Reynolds number shall not exceed 200).

3. The Contractor shall install inclined plate angles and plate spacing conforming to the manufacturer's specifications.

4. The clarifiers shall be equipped with a control panel to start and stop operation or a complete system control panel with various stages of control (e.g. manual to fully automatic).

5. The clarifiers shall have suitably sized inlet and outlet connections for transferring influent, sludge, and effluent.

6. Appurtenances shall include:

   a. Convenient access (catwalks, ladders, and stairs) for inspection and maintenance;

   b. Sludge scraper and underdrain for sludge discharge; and

   c. Sampling points for influent and effluent.

2.12 MUTLI-BAG FILTERS

A. The Contractor shall provide and install Multi-Bag Filter units to filter and reduce particulate matter remaining in the water treatment process stream after clarification. Bag filters shall be provided with the following features.

1. Bag filter units shall be multi-filter basket type with painted carbon steel housing construction with no indication of heavy rust or corrosion. Bag filters shall be sized to accommodate the treatment flow for the maximum daily dredge water volume calculated by the Contractor based on dredging production rates.

2. Housing units shall be pressure rated to 150 pounds per square inch (psi) maximum operating pressure.

3. Covers shall be counter balanced with a spring-assisted lift to freely open and close squarely to facilitate spent bag filter change-out and replacement.

4. Cover O-rings shall be Viton. O-rings shall be new and free from rust accumulation or other scaling from the underside of the cover and the top of the housing body.

5. Filter housing shall have suitably sized side inlet and bottom outlets to provide for easy and complete drainage. Inlet and outlet piping and/or fittings shall be equipped with shutoff valves and pressure gauges reading in psi.

6. Bag filter units shall be installed in parallel to enable bypass and continued operation of the WTS for spent bag filter change-out and replacement.

7. Filter baskets shall be of stainless-steel construction and shall accommodate standard size #2 double length filter bags.

8. Initial filter bag installation shall be 10 micron. However, the Contractor shall adjust micron bag filter ratings in accordance with field conditions and clarifier operation to optimize and balance system operation between the frequency of GAC media fouling and backwash cycles and bag filter changeouts.

9. The Contractor may, as an option, design and install bag filter units with automatic switchover.

2.13 GRANULAR ACTIVATED CARBON FILTER

A. The Contractor shall provide and install GAC Filter vessels to remove organic compounds [volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs)].

1. The GAC vessels shall be a circular, pressure rated configuration.

2. The Contractor shall provide GAC media, either virgin or reactivated, which conforms to manufacturer's specifications and NSF requirements set forth for the media's uniformity coefficient, bulk density, specific gravity, effective size, and depth.

3. GAC vessels shall be installed in lead-lag series with an additional lead-lag series installation of GAC vessels in parallel to enable bypass and continued operation of the WTS for GAC lead-lag vessels being serviced.

4. Each vessel shall have convenient access to all components and the media surface for inspection and maintenance.

5. The following appurtenances shall be provided:

a. Wash water troughs, surface wash or air scouring equipment;

b. Suitably sized inlet and outlet connections;

c. Valves which can be backwashed individually and which have means of positive control of the backwash rate;

d. Pressure gauges reading in psi on influent and effluent piping of both lead and lag vessels;

e. Positive means of shutting off flow to a vessel being backwashed;

f. Influent and effluent sampling points on each lead-lag vessel with ball valve and downturn tubing; and

g. Drain ports which allow for uniform distribution of backwash water.

**ALTERNATE II: If a reduction in treatment system footprint is necessary, the Contractor may propose installing three GAC vessels in series with bypass piping so as two GAC vessels

are valved to function in lead-lag and a third GAC vessel is in stand-by or otherwise being serviced.

2.14 BACKWASH WATER/ EFFLUENT STORAGE TANK

A. The Contractor shall provide and install a backwash/treated effluent holding tank to contain waters to be used for GAC vessel backwash and non-potable water for treatment equipment washdown and for cleaning and decontamination of operating equipment. The backwash storage tank shall be installed at the end of the WTS and shall be capable of being filled by diverting discharge that is directed to the turning basin.

1. Unless on-site space provisions prohibit, the backwash storage tank shall have the same size and working capacity as the Equalization/Storage Tank to hold a full day's dredging flow. Downsized backwash storage tank capacity from a full day of dredge water storage must be approved by the Engineer.

PART 3: EXECUTION

3.1 WATER TREATMENT SYSTEM

A. The WTS is to be constructed for the treatment of dredge spoil waters, decontamination and equipment wash water, and stormwater that may come in contact with dredge spoils or treatment equipment, or accumulate in secondary containment berms.

B. The installation of the system equipment shall be in strict accordance with the manufacturer's technical data and printed instructions. Equipment shall be installed on a temporary basis and supported by proper foundations. Installation of all materials and equipment shall be completed in such a manner to minimize damage to the Site and surrounding environment.

C. The treatment system will be constructed and operated at 450 Carroll Street, and will be limited to a 4,500-square-foot footprint unless otherwise indicated by the Engineer.

D. Anchor bolts, guy wires and supporting incidentals shall be furnished as required for proper installation. Locations of these items shall be depicted on the drawing and submitted as described in Section 01 33 00 – Submittal Procedures.

E. The WTS shall be sized to treat the daily calculated spoils pore water and excavation bucket free water associated with the Contractor's estimates of maximum dredge production rates and scow stormwater accumulation for up to a 2-inch rainfall event. Discharge of treated dredge water will be to the Turning Basin.

F. Operation of the WTS is anticipated to be intermittent to coincide with the accumulation of dredge water in scow and decanting to Equalization/Storage Tank(s). Design treatment flow rates should coincide to an 8-hour operator work day, providing for 6-hours/day of active water treatment to allow operator sufficient start-up and shut-down time for the day's water treatment. Unless otherwise directed by the Engineer, the treatment plant will not operate at night, during weekends or otherwise unsupervised.

G. Water collected in the dredge spoil scow shall be pumped overland along to a location depicted as proposed intertidal vegetation shelf in Drawing G-102 to the WTS Equalization/Storage Tank(s). Two effluent pipelines may also be routed along the intertidal vegetative shelf to accommodate treated dredge water effluent discharge back to the Turning Basin and return of effluent sludge from the WTS clarifier to a dredge spoil scow.

H. The Contractor shall coordinate dredge water decanting and return sludge scow moorings. Each influent and effluent water source shall have its own dedicated pipeline. Treated effluent water shall be discharged via downturn piping into the Turning Basin. All pipelines shall be heat-traced and insulated for winter operations.

I. Equipment used for the construction of the WTS shall be the standard product of manufacturers who regularly engage in the production of this type of equipment and who are fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed, delivered and installed in accordance with the best trade standards. Each treatment component furnished under this Section shall be the product of a manufacturer having a successful record of operation, manufacturing and servicing the equipment for a minimum of five years.

J. The GAC vessels shall be installed in series with lead and lag tanks to facilitate treatment and lead GAC tank sampling and breakthrough identification to prevent discharge of effluent in violation of applicable discharge criteria. The piping and control valves between GAC treatment systems shall be constructed to bypass spent lead-lag tanks to lead-lag tanks charged with fresh carbon to facilitate media changeout on the spent GAC vessels and continuous WTS operation. Piping at GAC vessels shall be equipped with sample ports to enable collection of water samples from lead and lag GAC tanks.

K. The system shall be designed with sufficient redundancy to accommodate system maintenance and unanticipated failure of a single component. Due to the limited Site footprint for the WTS layout, a single treatment train is proposed with sufficient Equalization/Storage Tank(s) capacity to store one full day of dredge water at maximum dredge production rate volumes. The Contractor will maintain critical process treatment equipment parts and components on-site or at a secure facility not more than one hour roundtrip travel time from the Site. The Contractor shall submit a list of identified critical equipment and component spare parts in accordance with Section 01 33 00 – Submittal Procedures. The Contractor shall include in the spare parts list documentation of manufacturer inventory and guarantee of 24-hour delivery to the Site for any major critical equipment or component not maintained on-site or at an off-site storage facility.

L. The Contractor shall install the WTS prior to initiating dredging activities. Installation and operation shall be subject to approval by the Engineer before dredging activities may commence.

M. The Contractor shall control noise and odors in accordance with Section 01 57 19 – Temporary Environmental Controls. Generators or similar off-grid sources shall comply with requirements set forth in RCNY Title 15, Chapter 28: "Citywide Construction Noise Mitigation," New York Administrative Code Title 24, Chapter 1: "Environmental Protection and Utilities – Air Pollution Control," and Section 01 57 19 – Temporary Environmental Controls.

N. The Contractor shall provide electrical service in accordance with the electrical requirements of Section 01 51 00 – Temporary Utilities, NEC, and local ordinances.

O. The Contractor shall transport chemicals and wastes in accordance with Section 02 51 19 – Excavated Material and Waste Management.

3.2 WATER QUALITY COMPLIANCE

A. The WTS shall be designed to treat the following contaminants, which were either detected in Site groundwater samples or that could be expected when water is pumped from dredge spoil scow:

1. VOCs and SVOCs;
2. LNAPL;
3. DNAPL;
4. Metals and polychlorinated biphenyls (PCBs); and,
5. Particulates (soil or colloidal particles).

B. The permit equivalency for the Turning Basin WTS has not yet been obtained. The Contractor will be required to complete any necessary pilot testing of the WTS, reporting and permitting to secure all necessary Federal and/or State and local municipal permits as directed by EPA, if necessary. Completed permit applications shall be submitted to the Engineer and EPA for review in accordance with Section 01 33 00 – Submittal Procedures prior to filing with the permit issuing agency.

C. The Contractor shall assume that the WTS shall, at a minimum, treat the known contaminants to levels below the Water Quality Requirements (WQRs) for permit equivalency indicated in Table 44 08 40-2 contained in the RTA 1 65% Remedial Design for the Gowanus Canal. The discharge and reporting requirements for the discharge will be in substantive compliance with the SPDES requirements of 6 NYCRR Part 750 and the Clean Water Act.

D. Groundwater quality data contained in Table 4 of the Preliminary Design Report, May 2018 and a Site plan depicting NAPL presence in soil borings and groundwater monitoring are included in Attachment B of this Section.

E. Site groundwater was found to contain iron at concentrations of up to 7.7 mg/L total (2 mg/L dissolved) and manganese up to 7.6 mg/L dissolved (7.3 mg/L total), the elevated concentrations of which can foul water treatment media.

F. Groundwater quality data from previous preliminary design phases should be used to help develop influent water quality characteristics. The Contractor shall complete additional water quality testing to acquire any additional water quality characteristics necessary to determine appropriate chemical treatment and water clarification to minimize the propensity for precipitate fouling requiring frequent bag filter change-outs or carbon media backwash. The Contractor shall confirm with the Engineer the existence and accessibility of groundwater monitoring wells (MW) on the Site for collection of groundwater samples.

G. The Contractor shall consider that in-situ groundwater quality may be materially different from dredge water derived from ex-situ soils. As the subsurface is disturbed during excavation and NAPL mobilized and homogenized with dredge spoils, the waters drained from soil pore space may contain higher concentrations of contaminants, including PCBs, which tend to adsorb to the organic sediments in spoils. Dredge water contamination may therefore be substantially higher than groundwater samples retrieved from screened MWs.

3.3 STORMWATER TREATMENT

A. Stormwater contacting dredge spoils, accumulated in process treatment equipment or impacted by spills, shall be transferred to the Equalization/Storage Tank(s) for treatment. Stormwater that has not been impacted by dredge spoil contact or spills may be released or treated.

3.4 SYSTEM COMPONENTS

A. Process Instrumentation and Control System

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall install and calibrate the process instrumentation and control system per manufacturer's specifications.

3. Testing. Production performance testing shall be conducted by the Contractor.

B. Secondary Containment

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall install secondary containment in accordance with manufacturer's recommendations.

C. Pumps

1. Preparation. The Contractor shall inspect pumps for defects prior to installation.

2. Installation. The Contractor shall install pumps in accordance with the manufacturer's installation instructions and recommendations. After installation and connection work is completed, the Contractor shall check the installation for correctness and rotation, verifying that connections are free of leaks and the system is operational. Installation personnel shall correct discrepancies. Prior to operating pumps, the Contractor shall furnish and install necessary lubricants for proper operation.

D. Piping and Hoses

1. Preparation. The Contractor shall inspect piping and hoses for defects prior to installation.

2. Installation. The Contractor shall install the piping system to match pumps and in accordance with manufacturer's specifications.

3. Testing. The Contractor shall leak test piping with potable water prior to beginning operation. The Contractor shall correct any leaks disclosed by this test in accordance with the manufacturer's recommendations.

E. Valves

1. Preparation. The Contractor shall inspect all valves for defects prior to installation.

2. Installation. The Contractor shall install valves per manufacturer's specifications. The Contractor shall install suitable shutoff and/or check valves at the suction and discharge lines of each pump. All shutoff and check valves shall be operable from floor level and accessible for maintenance.

3. Testing. The Contractor shall leak test valves with potable water prior to beginning operation. The system controls valve shall be tested to control all functions of the filter's back flushing, rinsing, and service cycles. The Contractor shall correct any leaks disclosed by this test in accordance with the manufacturer's recommendations.

F. Tanks

1. The Contractor shall install and secure tanks in accordance with manufacturer's specifications. Care shall be exercised in handling and bolting of the tank plates, supports,

and members to avoid abrasion or scratching of the coating. Touch-up coating shall be done in accordance with the manufacturer's recommendations, as required, and if directed by the Engineer.

2. Following completion of installation and cleaning of the tanks, the tanks shall be tested for liquid tightness by filling the tank to its overflow elevation. The Contractor shall correct any leaks disclosed by this test in accordance with the manufacturer's recommendations.

3. The Contractor shall use clean potable water at the time of installation for hydrostatically testing the tanks. The wash wastewater shall be captured and stored in backwash water/effluent storage tank during process start-up.

4. Filling and emptying the tanks shall be the responsibility of the Contractor.

5. The backwash water/effluent storage tank:

   a. Shall be sized to store one full day of dredge water volume at the maximum dredge production rate unless prohibited by space limitations. In such a case, the backwash tank shall be large enough to accommodate the water volume of two to three backwashes, depending on the anticipated frequency of GAC vessel backwashes and manufacturer's recommendations for backwash flow and duration;

   b. May be used to capture and test treated water to prove proper operation during process start-up before discharge; and

   c. Shall serve as a backwash water storage tank during routine operation.

G. Flow Measurement Systems

1. All components shall be inspected for defects prior to installation.

2. The Contractor shall mount instruments so that local indicators and readouts are readily observable from the ground. Mount instrumentation as high as possible in vault areas to avoid potential water damage per manufacturer's specifications.

3. Meters shall be installed in the correct direction to flow. Unless otherwise specified by the manufacturer, the flow measurement systems shall be installed with a minimum length of ten diameters of straight unobstructed rigid pipe on the intake side of the meter and a minimum of five diameters of straight unobstructed rigid pipe on the discharge side of the meters.

4. The flow measurement systems shall be installed so the pipes are full of water at all flow rates on both the intake and discharge sides of the meter. The Contractor shall inspect each unit periodically as part of a scheduled maintenance program, as indicated in manufacturer's instructions.

5. The Contractor shall calibrate units for ranges as indicated in manufacturer's specifications. The Contractor shall record initial flow meter readings at the time of installation. The Contractor shall record all measurement and configuration data, and complete appropriate documentation within one month of the completion of the flow-meter installation.

H. Flow Equalization/Storage/Settling Tanks and Oil-Water Separator

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications.

I. Polymer Feed and pH Adjustment Systems

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications. The Contractor shall perform a bench-scale test to optimize polymer/chemical dosage and adjust mixing conditions in accordance with this Section.

J. Lamella Clarifier

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications.

K. Bag Filter

1. Preparation. The Contractor shall inspect equipment and appurtenances for defects prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications.

L. Granular Activated Carbon Filter

1. Preparation. The Contractor shall inspect GAC vessels and appurtenances for defects prior to installation. The Contractor shall soak GAC media in potable water for maturation prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications.

M. Backwash/Effluent Storage Tank

1. Preparation. The Contractor shall inspect all parts and appurtenances for defects prior to installation.

2. Installation. The Contractor shall perform installation in accordance with manufacturer's specifications.

3. Testing. Testing shall be performed per manufacturer's specifications.

N. Winterizing

1. If ambient temperatures are expected to fall below freezing during the duration of the Work, piping and hoses shall be heat-traced and insulated and tanks, pumps and valves shall be winterized to prevent leaking and to maintain WTS operation.

O. Chemical Storage and Handling Areas

1. All chemical storage and handling areas shall conform to the local safety codes and requirements in Section 01 35 29.13 – Health, Safety, and Emergency Response Procedures for Contaminated Sites.

P. Labelling

1. All piping, tanks, and equipment shall be labelled with component name, number, treatment train number, flow direction, and fluid/chemical in pipe or component (i.e., NAPL, backwash, polymer, etc.).

3.5 INSTALLATION AND INITIAL TESTING

A. The acceptance test shall be performed after installation of all system equipment including extraction and discharge systems. The acceptance test shall be performed during the start-up period and the Contractor shall certify that the system has been installed in accordance with the approved WTS Plan.

B. Testing shall be of sufficient complexity and duration to fully demonstrate the operability of all equipment and systems with respect to functionality, rate and capacity over the specified operating ranges of the equipment provided. The testing program will be detailed in the System Start-up Plan, as discussed in Part 1.4.G of this Section. During the testing period, treated water shall be sent to designated storage tanks (backwash storage tank capacity may be used) and contained pending the results of laboratory analytical sampling indicating effluent discharge criteria has been met. Test waters will be reprocessed through the treatment system if the treated water exceeds the effluent discharge criteria.

C. The Contractor shall perform bench-scale jar testing of polymer/chemical prior to WTS start-up per manufacturer's recommendations to optimize polymer/chemical dosage and adjust mixing conditions for flocculation application.

D. Process instrumentation and control devices (such as flow meters, polymer/chemical dose control devices, pH meter, turbidity meter, and conductivity meter) shall be calibrated prior to WTS operation.

3.6 OPERATION AND MAINTENANCE

A. The Contractor shall provide and operate the WTS in a manner that results in achieving the required treatment of the various wastewaters present at the Site, as discussed in Part 3.2 of this Section.

B. In the event that the WTS does not achieve the treatment objectives, the Contractor shall follow all applicable regulatory reporting requirements in addition to the requirements of these Technical Specifications. The Contractor shall shut down the system or implement corrective action immediately and notify the Engineer of such deficiency and the corrective action taken, per the appropriate section in the O&M Plan.

C. If the Contractor fails to operate the system properly to achieve the treatment objectives, the Engineer may issue a stop work order until satisfactory corrective action has been taken.

D. The Contractor shall provide and maintain on-site all appropriate personnel, equipment and materials necessary for the operation and maintenance of the WTS. The system shall be operated in strict accordance with these Technical Specifications and the O&M Plan.

E. The Contractor shall routinely monitor effluent from the lead activated carbon unit for breakthrough of organics. Activated carbon media shall be replaced as directed by the manufacturer's specifications.

F. Influent and effluent samples shall be collected at a frequency required by the permit equivalent. The samples shall be marked, preserved and analyzed in accordance with the requirements of the O&M Plan. Effluent discharge monitoring, testing and sample analyses will be performed by others.

G. The Contractor shall maintain detailed documentation of the operations of the WTS in an operating log. Daily entries shall include process control variable readings (flow, pH, etc.), equipment maintenance logs, general observations and all monitoring activities. These monitoring activities shall include scheduled process control monitoring and final effluent compliance monitoring. There shall be sufficient monitoring data in the record to demonstrate proper operation of the system and compliance of discharge permit.

H. The Contractor shall maintain and provide to the Engineer monthly legible copies of complete, detailed and accurate records and reports of the services provided. All project records shall be kept on-site and shall be subject to examination upon request. These reports shall include, but not be limited to, the following:

1. Daily operating reports;
2. Daily reports of wastewater volume treated;
3. Reports of sludge volume generated;
4. Summary of process monitoring including analytical results (operation log);
5. Summary of compliance monitoring results; and
6. Other records and reports that may be required by Federal, State, and local regulatory agencies.

I. The Contractor shall manage and/or dispose of WTS-generated waste, including sludge, solids, NAPL, greases, spent bag filters and activated carbon filter media, according to Section 02 51 19 – Excavated Material and Waste Management and in accordance with all applicable Federal, State, and local requirements. The Contractor shall maintain records showing, at a minimum, the date of disposal, the characteristics of the material, the quantity of material, the transporter and the disposal location.

J. The Contractor shall monitor the water treatment effluent continuously for the following parameters: pH, conductivity and turbidity. Monitoring equipment shall be maintained and calibrated in accordance with the manufacturer's recommended procedures.

K. The Contractor shall maintain good housekeeping and neat conditions in the area of the WTS. Clean up of soils and/or water contaminated due to malfunction of the WTS shall be the responsibility of the Contractor.

[END OF SECTION]

FIGURE

GOWANUS CANAL

450 - CARROLL STREET STAGING AREA

BACKWASH LINE

DECANTED WATER INFLUENT FROM SCOW

EQ STORAGE TANK

EQUIPMENT WASHDOWN DECONTAMINATION WATER

SOLIDS DISPOSAL

(RETURN TO SCOW)

ALTERNATE I
COMBINE EQ/ SETTLING TANKS
SEE SPECIFICATIONS

SETTLING TANK

COAGULANT FLOCCULANT OXIDANT ph ADJUSTMENT

PUMPING STATION 1

MIXING VESSEL

CLARIFIER

PUMPING STATION 2

BAG FILTER 1

BAG FILTER 2

BAG FILTER 3

BAG FILTER DISPOSAL
(LAND BASED FROM 450 CARROLL ST)

TEMPORARY STORAGE TANKS
FOR INITIAL SYSTEM STARTUP ONLY

TANK TANK

GAC 1 GAC 2 GAC 3 GAC 4

BACKWASH STORAGE TANK

120 GPM

CARBON DISPOSAL
(LAND BASED FROM 450 CARROLL ST)

TREATED WATER EFFLUENT TO FSTB

ALTERNATE II
3 GAC VESSELS
SEE SPECIFICATIONS

GAC 1 GAC 2 GAC 3

RETURN SLUDGE TO SCOW FOR AMENDMENT AND DISPOSAL

SLUDGE DISCHARGE

SLUDGE HANDLING/RETURN

OWS

NAPL STORAGE TANK

NAPL DISPOSAL
(LAND BASED FROM 450 CARROLL ST)

GOWANUS CANAL

ABBREVIATIONS:

EQ	EQUALIZATION
GAC	GRANULAR ACTIVATED CARBON
FSTB	FIRST STREET TURNING BASIN
OWS	OIL-WATER SEPARATOR
NAPL	NON-AQUEOUS PHASE LIQUID
GPM	GALLONS PER MINUTE

FIRST STREET TURNING BASIN - GOWANUS CANAL
BROOKLYN, NEW YORK

WATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

AKRF | KSE
The AKRF-KSE JV

DRAWING
WTS-1

ATTACHMENTS

Item	Use/Performance Requirement	Additional Specifications
Influent Pipeline	Pipeline to convey dredge water from the dredge spoil scow to the WTS where, typically, decanted dredge water from the scow shall be pumped directly into the equalization/storage tank(s).	Pressurized above-ground pipeline. Capacity shall be sized for dredge water scow sump pump flow. All ancillary items (e.g. pipe supports, jersey barriers where there are no protective guard rails, heat-tracing, insulation, jacketing, pressure gauges, connections, etc. shall be provided).
Equalization/ Storage Tank(s)	To provide a minimum of one full day volume of dredge water storage and to allow accumulation of sufficient dredge water volume to equalize process flow and enable batch processing. Will also serve as primary settling tank for heaviest soil fractions of solids contained in dredge water.	Tank(s) shall be sized to provide storage for a minimum of one full day of dredge water volume plus stormwater accumulation and to facilitate continuous batch treatment of dredge water. Tank(s) should be designed to allow easy access to clean out solids/sludge from the bottom of the tank. Tank(s) shall be either self-contained (e.g., Adler Tanks) or placed into a dual-containment area (e.g. Baker tank within an appropriate secondary containment berm). Tank(s) will receive spent backwash, equipment wash, decontamination water, and stormwater. Solids from tank cleanings will be returned to the dredge scow. Alternate I: May be combined with Settling Tank to reduce WTS footprint.
Settling Tank	To settle out solids in the dredge waters not retained by the equalization/storage tank.	Tank shall be sized to settle out solids in dredge water from the equalization/storage tank at the maximum dredge water production flow plus stormwater accumulation. Tank shall be either self-contained or located within a secondary containment area. Solids from tank cleanings will be returned to the dredge scow. Alternate I: May be combined with EQ/Storage Tank to reduce WTS footprint.
Oil Water Separator (OWS)	To collect free oil (hydrocarbon and petroleum products), DNAPL, LNAPL, settleable solids and particulates.	OWS shall receive flow from the settling tank and shall be sized to the maximum dredge water flow plus stormwater accumulation. Tank(s) shall have secondary containment.
Pump Station #1	To pump water from the OWS to the clarifier.	Pumps, piping, and valving to efficiently pump the maximum calculated dredge water process flow from the OWS to the clarifier. Pump tank shall have secondary containment.
Chemical Additions	To adjust pre-clarifier dredge water quality to remove targeted cation metals (e.g., Fe, Mn, heavy metals) particulates and colloidal particles from the clarifier.	Water quality testing is required to: a) determine whether oxidant, coagulant, flocculant, or pH adjustment chemicals are needed, and if so, b) the specific chemicals and their specific dosages needed to precipitate out the targeted constituents. Due to the limited available footprint, chemicals shall be selected to maximize performance (e.g., minimize reaction times and optimize settling characteristics). Chemical feed systems shall have secondary containment.
Mixing Vessel	To mix chemicals (e.g., oxidants, coagulants, polymers, pH adjustment chemicals, etc.) into the dredge water prior to clarification.	Mixing Vessel shall be sized, and include equipment necessary, to mix pre-clarifier chemicals into the maximum flow of dredge water. Mixing Vessel can be attached to, or upstream of, the clarifier. Mixing Vessel shall have secondary containment.
Process and Bypass Piping	To convey wastewater between equipment in the treatment process.	Piping and valving to allow any treatment unit to be used or to be bypassed at the discretion of the Operator. Piping shall require secondary containment.
Backwash System	To allow backwashing of the GAC vessels and to flush out the clarifier and other equipment as necessary. Provides for non-potable water for equipment washdowns and decontamination.	Treated water shall be stored in a tank and a dedicated backwash pump shall pump the treated water to the designated vessel to be backwashed via a pipeline and required valving. Spent backwash water shall be pumped back to equalization/storage tank at the head of the WTS.
Clarifier	To remove targeted cation metals and compounds from the dredge water (e.g. Fe, Mn, heavy metals) to meet discharge criteria and to prevent chemical or biological fouling of the downstream GAC treatment units.	Clarifier shall be sized to treat the maximum dredge water flow rate plus stormwater. Clarifier shall be designed to maximize efficiency (e.g., counter/co-current inclined plate model, optimize settling characteristics, etc.) and be constructed with items to minimize the treatment process footprint (e.g., mixing tank/reactor vessel, an overflow weir that can be pumped out of, etc.). Clarifier shall have secondary containment. O&M Consideration: the clarifier sludge shall be characterized to determine whether sludge has to be handled and disposed of as hazardous waste or can otherwise be returned to dredge scow for amendment and disposal.

Item	Use/Performance Requirement	Additional Specifications
Pump Station #2	To pump the clarifier overflow through the ancillary treatment units (i.e., the bag filters and GAC units) and out to the FSTB discharge or backwash storage tank.	Pump Station #2 shall be similar to Pump Station #1 except that the pumps shall pump out of the clarifier overflow trough and the discharge head shall be different. Pumps shall have secondary containment. A sump/tank may be needed if pumping cannot be performed directly out of the clarifier.
Bag Filters	To remove particulate matter in the clarifier overflow prior to the granular activated carbon (GAC) treatment units.	Each bag filters shall remove particulate matter from clarifier overflow at the maximum dredge water flow rate. Bag filters shall have secondary containment. O&M Consideration: There may be times (e.g., while the clarifier sludge blanket is being fully formed, and when wastewaters bypass the clarifier) when there may be more particulates in the overflow than normal. Therefore, the size, control, and number of units may be designed to allow automatic switching between bag filter units to allow sufficient time for the subsequent changing of the spent filter bags to maintain continuous flow through the WTS.
Granular Activated Carbon (GAC) Units 1-4	To remove VOCs and SVOCs from the dredge water to meet discharge requirements.	Four identical GAC vessels shall be provided to allow single-pass, lead-lag treatment of the maximum dredge water flow; one lead-lag treatment train shall remain in standby. Virgin or certified regenerated GAC media may be used. GAC treatment units shall be sized to treat the VOCs and SVOCs at the project flow rates. GAC vessels shall be piped, valved, controlled, sized, and arranged to allow parallel or series operation, backwashing, and bypassing. GAC units shall have secondary containment. Alternate II: Can install three GACs with two in lead-lag and one stand-by in series with bypass piping to reduce WTS footprint.
Effluent Discharge Pipeline	To convey treated water from the WTS to the First Street Turning Basin (FSTB) excavation.	The effluent discharge pipeline shall convey treated water from the WTS to the First Street Turning Basin excavation. The discharge shall be a downturned elbow with vertical discharge into the turning basin.. All ancillary items (e.g., pipe supports, jersey barriers where there are no protective guard rails, heat-tracing, insulation, jacketing, pressure gauges, connections, etc.) shall be provided.
Effluent Sludge Return Pipeline	To convey sludge from the clarifier to dredge scow for amendment and disposal in accordance with the project specifications and Materials Handling Plan.	Sludge return pipeline shall convey sludge from the clarifier sump or tank to the dredge scow. Piping shall be durable and abrasion resistant. All ancillary items (e.g., pipe supports, jersey barriers where there are no protective guard rails, heat-tracing, insulation, jacketing, pressure gauges, connections, etc.) shall be provided.
Process Controls Main Control Panel and Motor Control Center (MCP and MCC)	To allow on-site control and monitoring of the WTS, monitor and track treatment system performance, provide sufficient communications during normal operation, to ensure appropriate communications during all alarm events, and to operate the system in accordance with the approved O&M plan.	Select a control method(s) commensurate with the hours of operator staffing and degree of system component monitoring required: manual, semi-automatic, automatic. Level of automation will be consistent with control requirements for a single operator to run the WTS for an 8-hour work day without overnight, weekend or otherwise unsupervised water treatment. Minimum automation will be provided for treatment flow rate, chemical feed rate, pump rate control, filter control and continuous recording of effluent water quality for pH, turbidity, and conductivity. High-high level controls and alarms shall be interlocked to pump flow controls and will shutdown the WTS for high-high level alarms and chemical storage low-low level alarms.

Notes:

1. Refer to the Process Flow Diagram, Figure WTS-1.
2. This Equipment List is for the major equipment items only, Contractor is responsible to include all other items needed to construct, operate, monitor, maintain, and decommission the WTS. Gravity vs. pumped flow from settling tank to OWS shall be determined at time of WTS design.

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: / Sample ID: / Sample Date: / NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
Anions										
Chloride	--	mg/l	250	--	8,600	250	12000	6500	13000	510
Nitrate-N	--	mg/l	10	--	< 1.0 U	< 1.0 U	11	< 1.0 U	1.1	< 1.0 U
Nitrite	--	mg/l	1	--	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Total Kjeldahl Nitrogen	--	mg/l	--	--	2.2	9.2	--	--	0.39	--
GenChem										
Biological Oxygen Demand	--	mg/l	--	--	< 2.0 U	< 2.0 U	< 2.0 U	8.9	< 2.0 U	7.6
Flashpoint	--	deg f	--	>140	>141	>141	>141	>141	>141	>141
pH	--	SU	--	--	7.5	7.2	6.8	7.7	7.4	7.4
Total Solids	--	mg/l	--	--	18,000	1,000	24,000	14,000	26,000	1,700
Total Suspended Solids	--	mg/l	--	350	25	12	30	65	29	160
Metals										
Aluminum	D	ug/l	--	--	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U
Aluminum	T	ug/l	--	--	< 200 U	< 200 U	< 200 U	710	< 200 U	3400
Antimony	D	ug/l	3	--	< 3 U	< 3 U	< 3.0 U	< 3.0 U	< 3 U	< 3.0 U
Antimony	T	ug/l	3	--	< 3 U	< 3 U	< 3.0 U	< 3.0 U	< 3 U	< 3.0 U
Arsenic	D	ug/l	25	--	< 2 U	< 2 U	< 6.0 U	3.9	< 6 U	2.5
Arsenic	T	ug/l	25	--	< 2 U	< 2 U	< 6.0 U	5.9	< 6 U	5.3
Barium	D	ug/l	1000	--	100	130	< 50 U	190	< 50 U	66
Barium	T	ug/l	1000	--	99	120	< 50 U	270	< 50 U	140
Beryllium	D	ug/l	3	--	< 3 U	< 1 U	< 3.0 U	< 3.0 U	< 3 U	< 1.0 U
Beryllium	T	ug/l	3	--	< 3 U	< 1 U	< 3.0 U	< 3.0 U	< 3 U	< 1.0 U
Cadmium	D	ug/l	5	690	< 2 U	< 2 U	< 2.0 U	< 2.0 U	< 2 U	< 2.0 U
Cadmium	T	ug/l	5	690	< 2 U	< 2 U	< 2.0 U	< 2.0 U	< 2 U	< 2.0 U
Calcium	D	ug/l	--	--	240,000	100,000	260,000	170,000	280,000	81,000
Calcium	T	ug/l	--	--	230,000	99,000	250,000	160,000	270,000	71,000
Chromium	D	ug/l	50	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Chromium	T	ug/l	50	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Chromium VI	T	mg/l	0.05	5	< 0.025 U	< 0.025 U	< 0.025 U	< 0.025 U	< 0.025 U	< 0.025 U
Cobalt	D	ug/l	--	--	< 6 U	< 2 U	< 6.0 U	< 6.0 U	< 6 U	< 2.0 U
Cobalt	T	ug/l	--	--	< 6 U	< 2 U	< 6.0 U	< 6.0 U	< 6 U	2.3
Copper	D	ug/l	200	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Copper	T	ug/l	200	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	54
Iron	D	ug/l	300	--	530	3100	450	4,400	< 300 U	2,000
Iron	T	ug/l	300	--	600	3200	540	6,600	430	7,700
Lead	D	ug/l	25	--	< 3 U	< 3 U	< 3.0 U	< 3.0 U	< 9 U	< 3.0 U
Lead	T	ug/l	25	--	< 3 U	< 3 U	< 3.0 U	19	< 9 U	78
Magnesium	D	ug/l	35000	--	580,000	48,000	750,000	430,000	790,000	54,000

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: / Sample ID: / Sample Date: / NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
Metals (continued)										
Magnesium	T	ug/l	35000	--	550,000	45,000	720,000	400,000	760,000	53,000
Manganese	D	ug/l	300	--	1,100	7,600	140	320	< 40 U	430
Manganese	T	ug/l	300	--	1,200	7,300	160	440	< 40 U	420
Mercury	D	ug/l	0.7	--	< 0.5 U	< 0.5 U	< 0.50 U	< 0.50 U	< 0.5 U	< 0.50 U
Mercury	T	ug/l	0.7	--	< 0.5 U	< 0.5 U	< 0.50 U	< 0.50 U	< 0.5 U	< 0.50 U
Nickel	D	ug/l	100	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Nickel	T	ug/l	100	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Potassium	D	ug/l	--	--	240,000	25,000	340,000	190,000	360,000	35,000
Potassium	T	ug/l	--	--	230,000	24,000	320,000	170,000	330,000	35,000
Selenium	D	ug/l	10	--	< 10 U	< 10 U	< 30 U	< 10 U	< 30 U	< 10 U
Selenium	T	ug/l	10	--	< 10 U	< 10 U	< 30 U	< 10 U	< 30 U	< 10 U
Silver	D	ug/l	50	--	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Silver	T	ug/l	50	--	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Sodium	D	ug/l	20000	--	4,900,000 D	150,000	6,500,000	4,200,000	6,700,000 D	330,000
Sodium	T	ug/l	20000	--	4,800,000 D	150,000	6,100,000	3,500,000	6,700,000 D	360,000
Thallium	D	ug/l	0.5	--	< 2 U	< 2 U	< 2.0 U	< 2.0 U	< 6 U	< 2.0 U
Thallium	T	ug/l	0.5	--	< 2 U	< 2 U	< 2.0 U	< 2.0 U	< 6 U	< 2.0 U
Vanadium	D	ug/l	--	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Vanadium	T	ug/l	--	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Zinc	D	ug/l	2000	--	< 50 U	< 50 U	< 50 U	< 50 U	68	< 50 U
Zinc	T	ug/l	2000	--	< 50 U	< 50 U	< 50 U	< 50 U	74	110
PCBs										
Aroclor 1016	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1221	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1232	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1242	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	0.28
Aroclor 1248	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1254	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	1.1
Aroclor 1260	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1262	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Aroclor 1268	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	< 0.26 U
Polychlorinated biphenyls	--	ug/l	0.09	--	< 0.05 U	< 0.05 U	< 0.28 U	< 0.25 U	< 0.05 U	1.4
SVOCs										
1,1-Biphenyl	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	12
1,2,4,5-Tetrachlorobenzene	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2,2-Oxybis(1-Chloropropane)	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2,3,4,6-Tetrachlorophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: / Sample ID: / Sample Date: / NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
SVOCs (continued)										
2,4,5-Trichlorophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2,4,6-Trichlorophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2,4-Dichlorophenol	--	ug/l	1	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
2,4-Dimethylphenol	--	ug/l	1	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
2,4-Dinitrophenol	--	ug/l	1	--	< 10 U	< 30 U	< 10 U	< 200 U	< 10 U	< 50 U
2,4-Dinitrotoluene	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2,6-Dinitrotoluene	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2-Chloronaphthalene	--	ug/l	10	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2-Chlorophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2-Methyl-4,6-dinitrophenol	--	ug/l	1	--	< 10 U	< 30 U	< 10 U	< 200 U	< 10 U	< 50 U
2-Methylnaphthalene	--	ug/l	--	--	**11**	**35 D**	< 2.0 U	**500**	< 2 U	**150**
2-Methylphenol	--	ug/l	1	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
2-Nitroaniline	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
2-Nitrophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
3,3-Dichlorobenzidine	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
3-Methylphenol, 4-Methylphenol	--	ug/l	--	--	< 0.5 U	< 1.5 U	--	--	< 0.5 U	--
3-Nitroaniline	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
4-Bromophenyl phenyl ether	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
4-Chloro-3-Methylphenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
4-Chlorophenyl phenyl ether	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
4-Methylphenol	--	ug/l	**1**	--	--	--	< 0.50 U	< 10 U	--	**31**
4-Nitroaniline	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
4-Nitrophenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Acenaphthene	--	ug/l	**20**	--	**6.1**	**55 D**	**2.5**	**210**	**4.1**	**88**
Acenaphthylene	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Acetophenone	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Anthracene	--	ug/l	**50**	--	< 2 U	< 6 U	< 2.0 U	**52**	< 2 U	**28**
Atrazine	--	ug/l	7.5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Benzaldehyde	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Benzo(a)anthracene	--	ug/l	**0.002**	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	**16**
Benzo(a)pyrene	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Benzo(b)fluoranthene	--	ug/l	0.002	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Benzo(g,h,i)perylene	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Benzo(k)fluoranthene	--	ug/l	0.002	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
bis(2-Chloroethoxy)methane	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
bis(2-Chloroethyl)ether	--	ug/l	1	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
bis(2-Ethylhexyl)phthalate	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: / Sample ID: / Sample Date: / NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
SVOCs (continued)										
Butyl benzyl phthalate	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Caprolactam	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Carbazole	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Chrysene	--	ug/l	0.002	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	15
Dibenzo(a,h)anthracene	--	ug/l	--	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Dibenzofuran	--	ug/l	--	--	< 0.5 U	**2.5 D**	< 0.50 U	**12**	< 0.5 U	**5.6**
Diethyl phthalate	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Dimethyl phthalate	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Di-n-butyl phthalate	--	ug/l	50	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
Di-n-octyl phthalate	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Fluoranthene	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	**46**	**2.3**	**28**
Fluorene	--	ug/l	50	--	< 2 U	**13 D**	< 2.0 U	91	< 2 U	**38**
Hexachloro-1,3-butadiene	--	ug/l	0.5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Hexachlorobenzene	--	ug/l	0.04	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Hexachlorocyclopentadiene	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Hexachloroethane	--	ug/l	5	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Indeno(1,2,3-cd)pyrene	--	ug/l	0.002	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Isophorone	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
Naphthalene	--	ug/l	10	19	45	210 D	< 0.50 U	1900	< 0.5 U	390
Nitrobenzene	--	ug/l	0.4	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
N-Nitrosodi-n-propylamine	--	ug/l	--	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
N-Nitrosodiphenylamine	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	< 10 U
p-Chloroaniline	--	ug/l	5	--	< 0.5 U	< 1.5 U	< 0.50 U	< 10 U	< 0.5 U	< 2.5 U
Pentachlorophenol	--	ug/l	1	--	< 10 U	< 30 U	< 10 U	< 200 U	< 10 U	< 50 U
Phenanthrene	--	ug/l	50	--	< 2 U	**23 D**	< 2.0 U	210	< 2 U	100
Phenol	--	ug/l	1	--	< 2 U	< 6 U	< 2.0 U	< 40 U	< 2 U	11
Pyrene	--	ug/l	50	--	< 2 U	< 6 U	< 2.0 U	75	**2.8**	**44**
TPH										
HEM Polar (Oil and Grease - Polar)	--	mg/l	--	50	< 5.4 U	< 5.2 U	< 6.2 U	**7.6**	< 5.2 U	< 6.0 U

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: Sample ID: Sample Date: NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
VOCs										
1,1,1-Trichloroethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,1,2,2-Tetrachloroethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,1,2-trichloro-1,2,2-trifluoroethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,1,2-Trichloroethane	--	ug/l	1	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,1-Dichloroethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,1-Dichloroethene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2,3-Trichlorobenzene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2,4-Trichlorobenzene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2-Dibromo-3-chloropropane	--	ug/l	0.04	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2-Dibromoethane	--	ug/l	0.0006	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2-Dichlorobenzene	--	ug/l	3	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,2-Dichloroethane	--	ug/l	0.6	--	< 0.5 U	< 0.5 U	< 0.50 U	< 0.50 U	< 0.5 U	< 0.50 U
1,2-Dichloropropane	--	ug/l	1	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,3-Dichlorobenzene	--	ug/l	3	--	**2.3**	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
1,4-Dichlorobenzene	--	ug/l	**3**	--	**6.5**	< 1 U	**5.1**	< 1.0 U	< 1 U	**2.4**
1,4-Dioxane	--	ug/l	--	--	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
2-Butanone (MEK)	--	ug/l	50	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
2-Hexanone	--	ug/l	50	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
4-Methyl-2-Pentanone	--	ug/l	--	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Acetone	--	ug/l	50	--	< 5 U	< 5 U	< 5.0 U	< 5.0 U	< 5 U	< 5.0 U
Benzene	--	ug/l	**1**	57	**0.67**	**4.2**	< 0.50 U	**17**	< 0.5 U	**8.9**
Bromochloromethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Bromodichloromethane	--	ug/l	50	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Bromoform	--	ug/l	50	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Bromomethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Carbon Disulfide	--	ug/l	60	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Carbon Tetrachloride	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
CFC-11	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
CFC-12	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Chlorobenzene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Chlorodibromomethane	--	ug/l	50	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Chloroethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Chloroform	--	ug/l	7	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	**2.4**
Chloromethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
cis-1,2-Dichloroethene	--	ug/l	5	--	< 1 U	**1.5**	< 1.0 U	**2.4**	< 1 U	< 1.0 U
cis-1,3-Dichloropropene	--	ug/l	0.4	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Cyclohexane	--	ug/l	--	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Analyte	T/D	Unit	NYSDEC TOGS (1.1.1) SGV	Location: Sample ID: Sample Date: NYCDEP Effluent to Sewer	MW-3S MW-3S-09122017 9/12/2017	MW-3D MW-3D-09122017 9/12/2017	MW-4S MW-4S-09132017 9/13/2017	MW-4D MW-4D-09132017 9/13/2017	MW-5S MW-5S-09122017 9/12/2017	MW-5D MW-5D-09132017 9/13/2017
VOCs (continued)										
Dichloromethane	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Ethylbenzene	--	ug/l	5	142	5.2	16	2.2	210	< 1 U	61
Isopropylbenzene	--	ug/l	5	--	< 1 U	4.4	< 1.0 U	23	< 1 U	12
m&p-Xylenes	--	ug/l	5	--	4.1	9.7	1.3	130	< 1 U	57
Methyl Acetate	--	ug/l	--	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Methylcyclohexane	--	ug/l	--	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Methyl-tert-butylether	--	ug/l	10	50	0.94	4.2	< 0.50 U	3.6	< 0.5 U	< 0.50 U
o-Xylene	--	ug/l	5	--	2.7	13	< 1.0 U	110	< 1 U	43
Styrene (Monomer)	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Tetrachloroethene	--	ug/l	5	20	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Toluene	--	ug/l	5	28	1.5	2.2	< 1.0 U	42	< 1 U	13
Total Xylenes	--	ug/l	5	28	6.8	23	1.3	240	< 1 U	100
trans-1,2-Dichloroethene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
trans-1,3-Dichloropropene	--	ug/l	0.4	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Trichloroethene	--	ug/l	5	--	< 1 U	< 1 U	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U
Vinyl chloride	--	ug/l	2	--	< 1 U	2.6	< 1.0 U	< 1.0 U	< 1 U	< 1.0 U

Table 4
Summary of Groundwater Sample Analytical Results
First Street Turning Basin
Brooklyn, New York

Notes and Abbreviations:

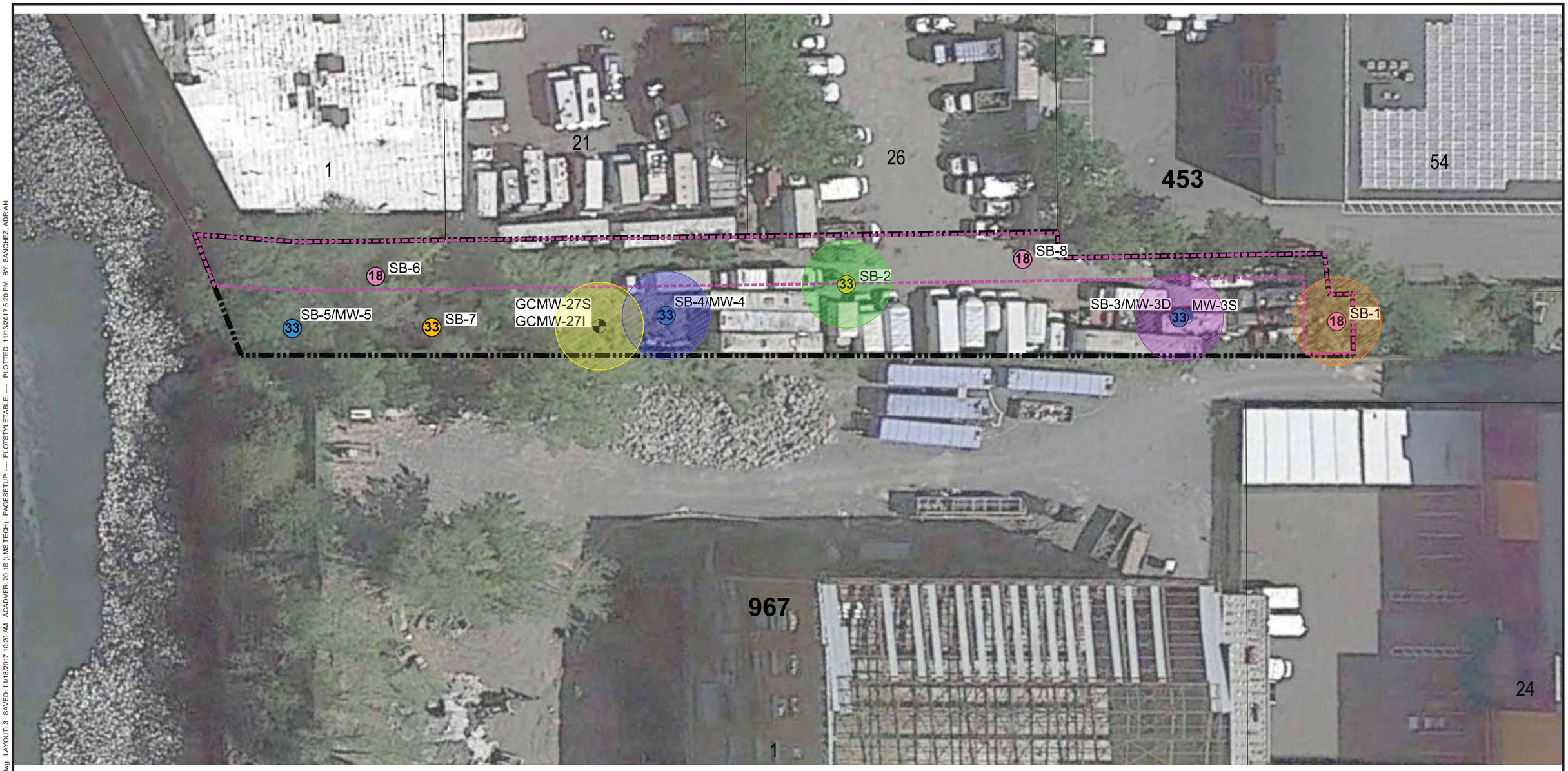
VOCs	Volatile Organic Compounds
SVOCs	Semi-Volatile Organic Compounds
PCBs	Polychlorinated Byphenols
ug/L	micrograms per Liter
T/D	Total/Dissolved
--	Not available.
Bold Font	Indicates detection above laboratory Method Dection Limit.
Red Font	Indicated an exceedence of TOGS (1.1.1) SGV.
	Compound concentration exceeds Effluent to Sewer Limitation.

NYSDEC	New York State Department of Environmental Conservation.
NYSDEC TOGS 1.1.1	NYSDEC Part 703.5 Class GA Ambient Water Quality Standards and Guidance Values.
TOGS	Technical & Operational Guidance Series.
SGV	Ambient Water Quality Standards and Guidance Values.

NYCDEP Effluent to Sewer - "Limitiations for Effluent to Sanitary or Combined Sewers"
- Parameter list is provided in DEP WQ-D001/Wastewater Quality Control Application/Rev. 11/2009, Table A.

NYCDEP	New York City Department of Environmental Protection.

Lab Qualifier	Definition
U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.



LEGEND:

- PROJECT SITE BOUNDARY
- LOT LINE
- PROPOSED CONSTRUCTED WETLAND AREA
- PREVIOUSLY INSTALLED MONITORING WELL
- OFF-SET MONITORING WELL
- SOIL BORINGS TO 18 FT BGS IN PROPOSED WETLAND SHELF
- SOIL BORINGS TO 33 FT BGS
- SOIL BORINGS TO 33 FT BGS; MONITORING WELL/SLUG TESTING
- 453 BLOCK NUMBER
- 54 LOT NUMBER

- NAPL DETECTED FROM 17-18 FT. BGS.
- NAPL DETECTED FROM 27-30 FT. BGS.
- NAPL DETECTED FROM 28-31 FT. BGS.
- NAPL DETECTED FROM 23-25, 28-33 FT. BGS.
- NAPL DETECTED FROM 17-21, 30-35 FT. BGS., AS NOTED IN EPA BORING LOG

NOTES:

1. BASE MAP PROVIDED BY AKRF ENGINEERING, P.C., PROJECTED TO NAD83 NY S.P. LONG ISLAND ZONE, US FEET.
2. IMAGERY PROVIDED BY USGS EARTHEXPLORER.
3. GCMW-27 PREVIOUSLY INSTALLED BY EPA.
4. BGS - BELOW GROUND SURFACE

0 20' 40'
APPROXIMATE SCALE IN FEET

FIRST STREET TURNING BASIN - GOWANUS CANAL
BROOKLYN, NEW YORK

OBSERVED NON-AQUEOUS PHASE LIQUID (NAPL) LOCATIONS

AKRF KES

FIGURE
3

THIS PAGE INTENTIONALLY LEFT BLANK