From: Snyder, PJ <PSnyder@geiconsultants.com>
Sent: Wednesday, June 08, 2016 11:10 AM
To: Spellman, John (DEC)
Cc: Mike Donegan; Gorges, Aaron
Subject: Latest Drawings and Specs for Troy-Smith Ave

John,

Mike asked me to send you the latest drawings and specs for the remedial construction at Smith Ave. The files are quite large, so I have saved them to our sharefile site for you to download. Please let me know if you're able to download them. If you can't access the site for any reason, let me know and I will come up with an alternate way to deliver them to you.

https://geiconsultants.sharefile.com/d-s31c5517c64649acb

These drawings and specs reflect the Q&A and addenda during the bid phase. They do not reflect any changes made during construction. Construction changes and as-built conditions will be captured in the record drawings which will be completed after the construction is finished.

Let me know if you have any questions.

Thanks,
PJ

PJ Snyder, PE
Project Manager
GEI Consultants
Consulting Engineers & Scientists
GEI Consultants, Inc.
400 Unicorn Park Drive | Woburn, MA 01801
T: 781.721.4085 | **M:** 781.424.9929
www.geiconsultants.com | vCard | map | LinkedIn | Twitter | Facebook

TECHNICAL SPECIFICATIONS
FOR
REMEDIAL ACTION

TROY SMITH AVENUE
FORMER MANUFACTURED GAS PLANT SITE

TO
NATIONAL GRID
REMEDIAL ACTION
PURCHASE ORDERS

Issued For Bid
Addendum 5 – August 25, 2014

TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 GENERAL

1.1. SUMMARY

A. This section contains general restrictions to be followed during the performance of the Work. Other sections of the specification may contain additional requirements/restrictions for performance of their specific subject matter.

1.2. SCHEDULE

A. Schedule restrictions have been placed on the performance of the Work as a condition of the permit granted by the U.S. Army Corps of Engineers (USACE).

B. Do not perform in-water work between March 1 and June 30 as indicated on the in the Project Permits.

C. The cost of demobilizing/remobilizing to the Site because of schedule problems related to completing the Work within the permit window is the responsibility of the Contractor.

1.3. WORK HOURS

A. Do not conduct Work outside of the permitted working hours, Monday through Friday 6:00 am to 9:00 pm per the City of Troy Codes, and no work on Federal holidays, without advanced approval from the Construction Manager (CM)/Engineer.

1.4. COMMUNICATION WITH THIRD PARTIES

A. Representatives of regulatory agencies from the USACE, New York State Department of Environmental Conservation (NYSDEC), United State Coast Guard (USCG) City of Troy, and other local civic organizations may be on-Site to observe and inspect the Work.

B. Direct communications with regulatory agency personnel to the CM/Engineer or their designee.

C. Do not communicate with the media/press, project stakeholders, elected officials, public, etc. regarding the Work. Refer all external questions and comments to the CM/Engineer.

1.5. SANITARY FACILITIES

A. No sanitary facilities are available at the Site for use by the Contractor.

B. Provide sanitary facilities for use by the Contractor personnel, Subcontractors, Engineer, and CM during the performance of the Work.

1.6. NOISE CONTROL

A. Comply with the City of Troy codes regarding acceptable noise levels and the Noise Control Work Plan included as Appendix C to this specification at all times.

1. Applicable sections of the City of Troy code are excerpted below:

§201-4 Prohibited noises.

The following acts, among others, are declared to be loud, disturbing, unnecessary, and unreasonable noises in violation of this chapter. Each subsection of this section shall be considered a separate and distinct Prohibited Noise, and the enumeration herein shall not be deemed to be exclusive:

E. Construction, demolition, excavation. The erection, including excavating, demolition, alteration or repair of any building other than between 6:00 a.m. and 9:00 p.m., except in case of an urgent necessity in the interest of public safety and then only with a permit from the Commissioner of Public Works, which permit may be renewed for a period of three days or less while the emergency continues.

2. Specific to the performance of the Remedial Action, which for the purposes of the code qualifies as construction:

> *Noise from tools, machinery and heavy equipment in the construction, repair or alteration of property. The use of domestic or industrial tools, machinery and equipment of any kind in construction, repair or alteration of property and resulting in loud grinding, hammering, sawing and similar noise shall be prohibited if said noise is unnecessary or unreasonable under the circumstances.*

B. Excerpts of the Village of Troy code provided within this Specification do not excuse the Contractor from complying with all other applicable portions of the code not contained herein.

C. Equip vehicles and motorized equipment with appropriate noise control devices to maintain noise levels that conform to current OSHA standards and State and local regulations. Take immediate steps to correct any deficiencies noticed, or as directed by the CM.

D. Properly maintain all mufflers and noise control devices, and replace when necessary. Operate all construction equipment in the manner that it was intended.

Excessive amount of noise and vibration due to improper use of equipment is prohibited.

E. All equipment that is required to operate beyond standard work hours will, to the maximum extent possible be, electrically driven.

1.7. EQUIPMENT LEFT ON-SITE

A. Secure all equipment left on-Site outside of standard work hours.

B. Ensure that all equipment, where feasible, is de energized when left on-Site and not in use to prevent electrical/fire/explosive hazards. The Contractor is responsible for the security, operation, and maintenance of any systems that require such services outside standard work hours. If systems are operational outside the standard work hours, provide oversight at all times when equipment is in operation, or provide an electronic monitoring system with a remote communication feature to alert the appropriate personnel of a system failure. Repair system failures in a timely manner such that the project schedule is not affected.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 14 00

SECTION 01 18 00
UTILITY PROTECTION

PART 1 GENERAL

1.1. SUMMARY

A. This specification contains the requirements for the location and protection of utilities affected by the performance of the Work.

1.2. UTILITY COORDINATION

A. The Contractor is solely responsible for any and all required notifications to utility companies prior to commencing the Work, and for response to any emergencies that may arise during the Work. Certain active and inactive utilities may currently be present at the Site. The exact location and type of utility is to be determined by the Contractor without reliance on information provided by National Grid and the Engineer. Use "soft-dig" air knife or hand excavation techniques to positively identify locations and type of underground utilities. Several utilities may currently serve the Site or adjacent properties including, but not limited to, electric, natural gas, water, sanitary sewer, storm sewer, and telephone/other communications (e.g. fiber optic cable).

1.3. PROTECTION OF EXISTING UTILITIES

A. Comply with the requirements of all applicable utility protection laws or regulations.

B. Contact and cooperate with utility companies to locate all utilities (including pipelines, cables, power poles, guy wires, and other structures) on the Site prior to beginning the Work.

C. Protect all utilities from damage during the performance of the Work, unless otherwise indicated to be removed or abandoned. If damaged, repair the utilities as required by the utility's owner at the Contractor's expense.

D. If a utility is encountered that is not shown on the Contract Drawings, or otherwise not made known to the Contractor prior to beginning the Work, promptly take the necessary steps to assure that the utility is not damaged, and notify the CM in writing of the presence of the utility. The CM will review the conditions and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

E. Immediately notify the CM of any incident involving a utility.

1.4. SUBMITTALS

A. Submit a utility survey as detailed in Specification Section 01 30 00 – Administrative Requirements.

B. Submit a utility incident report to the CM within 2 hours of any incident causing direct or indirect damage to a utility. At a minimum, document the following items in a utility incident report:

1. Description of the incident.
2. Damage assessment.
3. Corrective actions taken.
4. Initial estimate on the need for permanent repairs.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 18 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. This section describes the minimum level of coordination and meetings required to execute the Work in accordance with Sections 4.0 and 15.0 of the National Grid Terms and Conditions. Additional meetings and/or other coordination may be required.

1.2 SCHEDULE AND PHASING

A. The Work has been divided into four phases. Complete each phase of the Work as per the guidelines below. The Work for Phase V must be at Final Acceptance, as verified by the CM/Engineer, on or before August 1, 2015.

B. Phase I – Mobilization and Site Preparation: Complete this phase of Work, including utility location, temporary facilities, site protection, and survey control.

C. Phase II – Remediation of the Holder: Complete this phase of Work, including excavation, disposal, and backfill of the holder.

D. Phase III – Construction of the bulkhead.

E. Phase IV – Placement of turbidity curtain and absorbent boom, removal of steel sheet pile wall and soil, dredging and aquatic filling in the lock approach channel.

F. Phase V – Soil cap construction, final grading and site restoration.

1.3 ON-SITE CONSTRUCTION MANAGEMENT

A. National Grid will maintain a full time CM/Engineer on site for the duration of the Work. This CM/Engineer will be responsible for contractual oversight of the Work. The CM/Engineer will also be responsible for observing the Work relative to conformance with the technical requirements of the Contract Drawings and Specifications, and with construction quality assurance, ensuring that the Work is completed in accordance with the Contract Documents, and final certification of the Work.

B. The Contractor will maintain a full-time on-Site Superintendent, who will be responsible for QA/QC, and Contractor health and safety. The Superintendent will be responsible for the supervision and/or coordination of all Contractor employees, Subcontractors, manufacturers, fabricators, suppliers, distributors, installers, and testing agencies whose services, materials, or equipment are required to ensure the completion of the Work. The Superintendent must have sufficient qualifications, experience, and authority to act as a single point of

contact for the on-Site staff, and to make adjustments to the means and methods as needed and as requested by National Grid and the CM/Engineer.

C. The Contractor will maintain an independent third party, full-time on-Site Health and Safety officer in accordance with Section 6.13 of the National Grid Standard Conditions. The Health and Safety officer may not have other on-Site responsibilities or duties outside of health and safety.

D. New York State Department of Environmental Conservation (NYSDEC) may maintain a part/full-time field representative for the duration of the Work.

1.4 MEETINGS

A. Attend Project meetings as often as deemed necessary by National Grid during the term of the Agreement.

B. A post-award meeting will be held at National Grid's Syracuse, New York office, the Site, or via teleconference to discuss Project submittals, schedule, etc. Contractor's Officer-in-Charge, Project Manager, and Superintendent for the Project will attend the meeting.

A pre-construction meeting will be held, in accordance with Section 2.05 of the National Grid General Standard Conditions at the Site prior to start of Work. At a minimum, the Contractor's Project Manager and/or Superintendent for the Project will attend the meeting. It is recommended that the Contractor assemble input from the primary Subcontractors. This meeting is intended to make certain that the Work is properly scheduled, responsibilities are coordinated among Subcontractors and suppliers, and that those responsibilities are reflected on the Contractor's submittals. Questions concerning the administrative requirements outlined during the Pre-construction conference or any other aspect of the Project may also be addressed.

C. Beginning with the mobilization on the Site, facilitate weekly construction meetings for the duration of the Work. Prior to mobilization and if necessary, bi-weekly meetings may be held via teleconference. After mobilization, weekly meetings will be held at the Site. Present a progress update at all weekly construction meetings to include all tasks completed from the prior week, currently active tasks, and tasks/activities planned for the next two weeks.

D. The standard meeting day and time for the weekly construction meeting will be established based on mutual agreement with the CM/Engineer and the other participants. Prior to each weekly meeting the CM/Engineer will prepare a meeting agenda. Participants in the weekly meeting may include representatives of National Grid, NYSDEC, the City of Troy, and the USACE, the Contractor, and applicable subcontractors.

E. Special construction meetings will be held at the Site or other designated locations to discuss urgent construction issues. The Contractor, National Grid, the

CM/Engineer, or NYSDEC may call special construction meetings. Coordination (agenda, meeting minutes, location, time, and attendance) of special construction meetings is the responsibility of the organization calling the meeting. Special construction meetings will be called judiciously.

F. Ensure weekly construction meeting and special construction meeting attendance by all Contractor staff required to discuss and make decisions relative to the meeting agenda.

G. Make physical arrangements for all meetings to be held on-Site. The National Grid service center located at the Site will have a room available for these project meetings, subject to scheduling with prior notice.

H. All expenses associated with attending the meetings, except those that are incurred by National Grid, their representatives or consultants shall be borne by the Contractor.

1.5 REQUESTS FOR INFORMATION, CLARIFICATIONS, AND CHANGES

A. All Contractor communications regarding discrepancies, claims, and change conditions will be made in accordance with Article 9 of the National Grid Standard General Conditions.

B. All Contractor requests for Project information and clarifications or changes in the requirements of the Contract Documents must be made in writing to National Grid and the CM/Engineer.

C. Written requests must be provided regardless of any preceding conversations and preliminary decisions regarding the matter(s) subject to the requests.

D. At National Grid's discretion, email communications may qualify as "requests made in writing" for the purposes of this provision.

E. National Grid or the CM/Engineer will provide written responses to the request.

F. At their discretion, National Grid or the CM/Engineer may provide verbal approvals of requests to expedite the Work. In such cases, the Contractor is still required to provide written documentation of request and National Grid or CM/Engineer approval.

G. National Grid or the CM/Engineer may also issue clarifications and/or amendments based on their own assessment of Project needs.

H. Any potential increases or decreases in Contractor compensation due to amendments will be in accordance with the provisions of the National Grid Standard Conditions.

I. National Grid and/or their representative will issue the Contractor supplemental instructions authorizing minor changes in the Work that may or may not involve adjustments to the Contract Price or the schedule.

J. If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes in the Work by submitting a detailed request to include labor rates, equipment rates, material costs, etc. for a change to National Grid and/or their representative.

K. Document Change Order requests in accordance with the requirements of the National Grid General Standard Conditions, and with the procedures set forth by National Grid during procurement.

L. The CM/Engineer may issue an Authorization for Contract Change (ACC) on behalf of National Grid, which instructs the Contractor to proceed with a change in the Work, for subsequent inclusion for a Change Order. Any ACC must be authorized by National Grid in advance and signed by the CM/Engineer and National Grid.

1.6 COMMUNITY RELATIONS

A. National Grid will provide all external communication with the media/press, Project stakeholders, elected officials, public, etc. Do not communicate with the media/press, project stakeholders, elected officials, public, etc. regarding the Work. Refer all external questions and comments to National Grid.

1.7 RECORDS

A. Maintain on-Site copies of all Project correspondence and Project documents generated during the Work.

1.8 PRE-MOBILIZATION SUBMITTALS

A. All submittals are subject to review and approval by National Grid and the CM/Engineer. Follow the procedures detailed in Specification Section 01 33 00 – Submittal Procedures when submitted items for review.

B. Contractor Health and Safety Plan:

1. Submit Contractor Health and Safety Plan in accordance with Section 01 35 00 Special Submittals.

2. Include relevant safety information for all proposed and likely Site activities.

3. Contractor Health and Safety Plan is to be prepared and reviewed by a certified industrial hygienist.

C. Critical Path Method Project Schedule:

D. 1. Prepare a Critical Path Method (CPM) Project schedule. Update and disseminate the schedule on a weekly basis prior to the weekly construction meetings.

E. Pre-Construction Survey Results:

F. 1. Perform a pre-construction survey of the Site to 50 feet beyond the Project limits under the supervision of the CM/Engineer. This survey will include meets and bounds of the National Grid and USACE properties.

G. 2. Submit the findings of the pre-construction survey to the CM/Engineer for review and approval prior to mobilization.

H. 3. Include video/photographic documentation of the existing conditions of the Site and surrounding structures, such as the bulkhead.

I. 4. Claims determined to be resulting from pre-existing structural and/or cosmetic damage, not identified during the pre-construction survey, will be the responsibility of the Contractor.

J. Schedule of Permits:

1. Submit a schedule of applicable permits including approximate lead time. Indicate any action items or information required from the CM/Engineer.

2. Submit copies of all supplemental data required by permits with documentation that the supplemental data was provided to the entity that issued the permit according to the schedule required by the permit.

3. Submit copies of complete permit applications to the CM/Engineer prior to submittal to the regulatory entity.

4. Submit copies of fully executed permit applications and final permits to the CM/Engineer.

K. Remedial Action Contingency Plan:

1. Prepare the Remedial Action Contingency Plan (RACP). This plan will describe the provisions required for responding to Site-related emergencies that could potentially occur during the Work. The RACP will, at a minimum, present the following components:

a. A spill response plan (SRP) for addressing spills that occur on Site during berm construction activities. The SRP will describe the methods, means, and facilities required to prevent soil, water, structure, equipment, and material impacts caused by spills; provide information regarding spill containment and cleanup, and provide information related to decontamination measures.

b. Procedures that Contractor's personnel will take in response to an emergency.

c. Designation of an emergency coordinator.

d. Include a current list of all emergency equipment and evacuation plans.

e. Procedures for monitoring weather emergencies and discussion of how weather conditions and notifications will impact Site operations.

f. Procedures and routes for emergency vehicular access/egress.

g. Procedures for the evacuation of personnel from the Site.

h. A listing of contact personnel with phone numbers that, at a minimum, includes fire officials, ambulance service, local, county, and state police, local hospitals, a spill response team.

i. Routes to local hospitals, including written directions and a map that depicts the location of the Site relative to the hospital(s).

L. Site Operations Plan:

1. Submit a Site Operations Plan (SOP) in accordance with 01 35 00 Special Submittals.

1.9 DAILY REPORT

A. Prepare a daily report summarizing the staff and equipment used and the Work performed each Day and anticipated Work for the next Day. The daily report should also list all daily quantities applicable to pay items listed on the Project Price Schedule. The Contractor's internal documentation used for this purpose may be used to fulfill this requirement, subject to approval by the CM/Engineer. At a minimum the daily report will include the following additional items:

1. Description of any QC testing performed and the results.

2. Material placement and location for each working Day. Submit certified weight tickets for material imported for fill and exported for off-Site disposal.

3. Estimate of the placement rate, number of trucks needed for transportation of import materials.

B. Submit daily report for each working Day by 10 AM of the next Day worked.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 30 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. This section summarizes the protocol and procedures for the preparation and delivery of required submittals to the CM/Engineer.

1.2 GENERAL REQUIREMENTS

A. Provide all submittals in hardcopy format directly to the CM/Engineer in accordance with the schedule and procedures contained in this section and Article 6.16 of the National Grid Terms and Conditions.

B. Include calculations, construction drawings, shop drawings, plans, reports, records, photographs, diagrams, and details with submittals where applicable to facilitate the review and/or approval.

C. For all submittals, provide six (4) copies; two (2) to the CM/Engineer, and two (2) to National Grid, unless otherwise noted by the CM/Engineer.

D. If directed by National Grid or the CM/Engineer, provide submittals electronically in the format requested (i.e. document file, drawing file, image file, etc.). For electronic drawings, submit an AutoCAD file (2004 thru 2010 release) using e-transmit feature (i.e. include external references, image files, color table file, font file, line file, etc.). Convert all AutoCAD add on data to AutoCAD format. Use descriptive layer titles (not numbers only). Use extensive layer control and use line color by layer and line type by layer. AutoCAD files of Contract Drawings will be available to the Contractor upon request.

E. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and Certifications shall be signed by an officer, or other individual, authorized to sign documents on behalf of that entity. Submittals requiring preparation by an engineer shall be signed and sealed by a Professional Engineer licensed to practice engineering in the State of New York.

F. Schedule submittals to expedite Work. Provide the CM/Engineer a minimum of 5 working Days, excluding transmittal time, for review.

1.3 SUBMITTAL SCHEDULE

A. See Table 01 33 00-1 Project Submittal Summary attached at the end of this Section. Submittals are required on the items as described individually in each Section of the Technical Specification.

1.4 SUBMITTAL PROCEDURES

A. Use the submittal numbers assigned in Table 01 33 00-1. For submittals not included in Table 01 33 00-1, use the next sequential number as the submittal number. For revised, use original number and a sequential alphabetic suffix. For multiple submittals with the same submittal number, use the original number with a sequential numerical suffix.

B. Use a cover form for submittals. The cover form will include Project identification, Project number, date, submittal number, submittal description/title, submittal exclusions, special issues, Contractor, Subcontractor, etc.

C. Include drawings and details as appropriate.

D. Use the same units of weights and measures used on all submittals as are used in the Contract Documents.

E. Submit all supplier and Subcontractor submittals.

F. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, are in accordance with the requirements of the Work and Contract Documents.

G. Sign the following certification as part of the Submittal Form.

1. I hereby certify that I have carefully examined the enclosed submittal(s) and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal(s) with other submissions and the work of other trades and contractors, and to the best of my knowledge and belief, the enclosed submittal(s) is/are in full compliance with the Contract Documents, except as follows (enter “NONE” if there are no exceptions).

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

I. Prepare submittals that are complete and in sufficient detail for ready determination of compliance with the contract requirements.

J. Revise submittals as requested by the CM/Engineer. Identify all changes made since the previous submission.

K. Submittals not requested will not be recognized or processed.

1.5 SUBMITTAL REGISTER

A. Maintain a Technical Submittal Register at the Site including the submittal number, description, date submitted, status, date of approval/rejection in accordance with Article 6.16 of the National Grid Terms and Conditions.

1.6 SUBMITTAL REVIEW

A. The CM/Engineer will review all submittals solely for the purpose of determining whether the information contained in the submittal conforms to the design concept of the Contract Documents. The CM/Engineer will return the submittals with the following classifications:

1. Approved as Submitted: Work may proceed, no exceptions taken.
2. Approved as Noted: Work may proceed subject to comments, resubmittal not required.
3. Revise and Resubmit: Work may not proceed, resubmittal required for indicated items. Proceed with work on other items subject to comments.
4. Rejected: Work may not proceed, resubmittal required. Submittal unresponsive and/or not in conformance with Contract Documents.
5. For Information Only: Items not reviewed or items for which no submittal is required.

B. CM/Engineer's review of submittals for conformance with Contract Documents does not relieve the Contractor from responsibility with regard to fulfillment of the terms of the Contract and proper and complete performance of the Work in accordance with the requirements of the Contract Drawings, Specification, applicable permits, as well as the general requirements of the Contract Documents.

C. CM/Engineer's review of submittals does not relieve the Contractor from responsibility for errors or omissions in its designs, details, calculations, analyses, test methods, materials, and its sole responsibility for means and methods of construction, and safe and successful construction of the Work.

1.7 CERTIFICATES OF COMPLIANCE

A. Execute any certificates required for demonstrating proof of compliance of materials with the requirements of the Contract Drawings and Specifications in three (3) copies.

B. Sign each certificate by an official authorized to certify on behalf of the manufacturing or testing company and provide the name and address of the Contractor, the Project name and location, and the quantity and data, or dates of shipment or delivery to which the certificates apply.

C. Provide the name and address of the testing laboratory and the date or dates of the tests to which the report applies with copies of laboratory test reports that are submitted with certificates.

D. Certifications are not to be construed as relieving the Contractor from furnishing satisfactory material, if, after tests are performed on selected samples, the material is found not to meet the specified requirements.

1.8 INVOICES

A. Submit invoices monthly in accordance with the provisions of the National Grid General Conditions and Supplemental Conditions.

1. Include update of Price Schedule with each invoice.

2. Payment will not be made unless all the proper support documentation has been submitted and approved by National Grid or National Grid's representative.

SUBMITTAL SUMMARY TABLE 01 33 00-1

Submittal Number	Description of Submittal	Submission Deadline	Referenced Specification Section
PRE-CONSTRUCTION			
1	Critical Path Method Project Schedule	Submitted with Bid, updated weekly during construction	01 30 00
2	Pre-Construction Bathymetric Survey Results	2weeks prior to start of Dredging	01 77 00
3	Site Operations Plan	2 weeks after award	01 35 00
4	Contractor Health and Safety Plan	1 week after award	01 35 00
5	Contractor Quality Control Plan	1 week after award	01 30 00
6	Contingency Plan	1 week after award	01 30 00
7	Schedule of Permits	1 week after award	01 30 00
9	Borrow Source Evaluations	2 weeks prior to importing fill to the Site	31 23 00
10	Utility Survey	1 week prior to mobilization	01 30 00
11	Permits and Data Submittals	Prior to submittal to agency	01 30 00
12	Final Executed Permits	Upon receipt	01 30 00
13	Disposal Facility Contracts	1 week prior to off-site disposal	02 61 00
REMEDIATION			
14	Daily Report	10:00 AM of the next work Day	01 30 00
15	Invoices	Monthly	01 33 00
16	Micropiles – Rock Anchors Submittal		01 35 00
PROJECT CLOSEOUT			
16	Substantial Completion	Work is at Substantial Completion	01 77 00
17	Record Documents	Prior to application for Final Acceptance	01 77 00
18	As-built Survey	Prior to application for Final	02 21 00

Submittal Number	Description of Submittal	Submission Deadline	Referenced Specification Section
		Acceptance	
19	Utility Repair Confirmation	Prior to application for Final Acceptance	01 77 00
20	Permit Closeout	Prior to application for Final Acceptance	01 77 00
21	Final Acceptance	Work is complete	01 77 00
22	Final Invoice	After Final Acceptance	01 77 00

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 33 00

SECTION 01 35 00
SPECIAL SUBMITTALS

PART 1 GENERAL

1.1 SITE OPERATIONS PLAN

A. Requirements of the Site Operations Plan (SOP) are presented throughout the technical specifications, however, at a minimum it will include information regarding the following project components:

1. Part 1: Project Management and Coordination
    a. Identify and present the resumes of Key Project Personnel, at a minimum to include:
        i. Project Superintendent
        ii. Remediation Supervisor
        iii. Bulkhead Construction Supervisor
        iv. Dredging Supervisor
        v. Health and Safety Officer
        vi. Project Surveyor
    b. Present the staffing levels for each phase of Work and major task.
    c. List the proposed Subcontractors, including transporters and off-Site disposal facilities.
    d. List the major equipment, systems, and materials.
    e. List the permits and approvals to be obtained by the Contractor, including contact names, titles, and phone numbers.
2. Part 2: Construction Progress Documentation
    a. Present the Construction Progress Schedule.
    b. Present the template for Daily Progress Reports
    c. Present the template for two-week proposed schedules.
3. Part 3: Mobilization
    a. Identify the key equipment and materials to be mobilized to the Work Site prior to starting construction activities.
    b. Present the schedule for mobilization.
4. Part 4: Utility Protection
    a. Present shop drawings and procedures for utility protection measures.

b. Contact DIGSAFE to perform a utility markout.

c. Conduct a utility survey of the excavation area using a private utility locating service and markout all suspected utility locations. Confirm all suspected utility locations with the utility provider prior to beginning intrusive activities.

d. Provide copies of all DIGSAFE numbers/tickets/utilities plates/private utility location information to the CM/Engineer prior to beginning intrusive activities. The CM/Engineer will maintain copies on-Site in a clearance package.

5. Part 5: Execution of Work

a. Present shop drawings and procedures describing the means and methods for remediation of the holder, construction of the bulkhead, and dredging operations.

6. Part 6: Maintenance

a. Identify the key equipment and materials that will remain at the Work Site after the completion of work. This includes the navigational controls left in place until the remediation is completed.

b. Present the schedule for inspection and maintenance of these materials.

1.2 CONTRACTOR HEALTH AND SAFETY PLAN:

A. Develop and implement a Health and Safety Plan (HASP) for Contractor and Subcontractor personnel to comply with all applicable health and safety regulations, including but not limited to :

1. 29 CFR Part 1910 –Occupational Safety and Health Standards

2. 29 CFR Part 1926 –Safety and Health Regulations for Construction

3. CFR Title 33 – Navigation and Navigable Waters

4. EPA Executive Order 1440.2 – Health and Safety Requirements for Employees Engaged in Field Activities.

5. DHHS (NIOSH) Publication No. 85-115 – Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.

6. EPA Standard Operating Safety Guides, Publication 9285.1-03

7. 454 CMR –Division of Occupational Safety

B. In the event there is a conflict between the requirements of individual health and safety codes and regulations, meet the more stringent requirement.

C. The Contractor HASP shall include the following project-specific requirements:

1. Procedures and precautions for working on or near water.

2. Procedures and precautions for underwater diving operations, if necessary to perform the Work.

3. Notification procedures for reporting to the Engineer:

4. Situations requiring a permit or checklist for confined space entry or hot work (welding or torch cutting).

5. Health and Safety incidents, including, but not limited to injuries, accidents, near-miss, or unsafe conditions.

1.3 SEVERE WEATHER PLAN:

A. Develop a Severe Weather Plan describing the actions to be taken to protect persons and property and prevent the spread of the berm materials in the event of severe weather warnings or extreme conditions.

B. Include in the Severe Weather Plan at minimum the following:

1. The types of storms anticipated (winter storm, hurricane, tornado, etc.)

2. The time intervals before storms when action will be taken and the details of actions to be taken.

3. List of the equipment to be used on the project and its ability to handle adverse weather.

4. Distance from the Work area to a safe place and the time required to move the equipment.

5. Methods of securing equipment not moved.

6. Plan of evacuation to include immediate reaction plans to be taken for all storm occurrences, particularly sudden storms.

7. A statement that full time monitoring of the National Oceanic and Atmospheric Administration (NOAA) marine weather broadcasts and other local commercial weather forecasting services will be the Contractor's primary source of information in the decision process to implement action under the Severe Weather Plan.

8. List levels or conditions that will trigger actions described above.

1.4 ICE MANAGEMENT PLAN:

A. Develop an Ice Management Plan describing the actions to be taken to allow barges safe access to the Work area and safe work operations at the Work area in the event of ice accumulation in the Hudson River and/or the lock approach area.

1.5 MICROPILES – ROCK ANCHORS:

A. The Subcontractor shall be experienced in the design, construction and load testing of micropiles/rock anchors and shall provide documentation of a minimum

of three (3) projects performed in the two (2) year period preceding the bid date in which micropiles/rock anchors were installed successfully under subsurface and project conditions similar to those of the current project. The Subcontractor shall also provide documentation that the designated job site supervisor (foreman or crew chief) has a minimum of three years of experience in supervision of the installation of micropiles/rock anchors. Drill rig operators shall be documented to have a minimum of three (3) years' experience installing micropiles.

B. The Subcontractor shall assign a Project Manager to supervise the work that has a minimum of three (3) years experience with projects of similar size and scope. The Subcontractor shall not use consultants or manufacturers' representatives to satisfy the Project Manager requirements of this section. Five copies of the completed project reference list and personnel list shall be submitted by the Subcontractor before the planned start of pile construction.

C. The project reference list shall include a brief project description with the project Purchaser's name and current phone number. The personnel list shall identify the Subcontractor, Project Manager, drill rig operators, and job site supervisor to be assigned to the project. The personnel list shall contain a summary of each individual's experience and be complete enough for the Engineer to determine whether each individual satisfies the required qualifications. The work shall be performed by the personnel listed on the submittals. If personnel changes need to be made during the course of the project, work shall be suspended until the replacement personnel are approved by the Engineer. Additional time required due to incomplete submittals, unacceptable submittals, or obtaining approval of replacement personnel will not be cause for a time extension or delay claims. All costs associated with incomplete, replacement, or unacceptable submittals shall be borne by the Subcontractor.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 35 00

SECTION 01 41 00
REGULATORY REQUIREMENTS – PERMITS

PART 1 GENERAL

1.1 SUMMARY

A. This section establishes responsibility for obtaining major Project permits between National Grid, the CM/Engineer, and the Contractor.

1.2 NATIONAL GRID PERMITS

A. National Grid will obtain the following Project permits:

1. Approvals from NYSDEC and/or NYSDOH, including a SPDES Permit Equivalent for discharge of pre-treated site water to the Hudson River.

2. USACE/NYSDEC permits and approvals for work within the navigable waters of the U.S.

1.3 CONTRACTOR PERMITS

A. Obtain the following Project permits in accordance with Article 6.07 of the General Conditions:

1. Local building, construction and demolition permits, if necessary.

2. Permits required for temporary road closures, if necessary.

3. Permits required for temporary access entrances off of public roads, if necessary.

4. Permits required for parking and traffic restrictions on public roads, if necessary.

5. Local variances for temporary fence installation, if necessary.

6. Any other permits required for the Work.

B. This Section does not describe all permits required for performance of the Work. Any permits not identified in this Section, or elsewhere in the Contract Documents, are the responsibility of Contractor.

C. Regardless of who is responsible for obtaining a permit, the Contractor is responsible for performing in accordance with the terms and conditions of all permits.

D. Provide any technical and equipment related data required for the CM/Engineer to obtain the necessary permits.

1.4. COORDINATION/ASSISTANCE

A. National Grid and/or the CM/Engineer will coordinate delivery of Contractor submittals to NYSDEC and/or NYSDOH, as required.

B. Provide all data requested by National Grid or the CM/Engineer required to support permit applications. When necessary, National Grid and/or the CM/Engineer may provide data summaries or other Project information to the Contractor in support of Contractor data submittals.

C. Any coordination and/or assistance between National Grid and the CM/Engineer are provided in the interest of expediting the Project. Provision of coordination and/or assistance does not relieve the Contractor of any obligations regarding the timeliness and completeness relative to the permit submittals.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 41 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, laboratory testing, materials, and performing all operations required for providing temporary facilities and controls during the performance of the Work.

PART 2 PRODUCTS

2.1 MATERIALS AND FACILITIES

2.2 FIELD OFFICES

A. The National Grid service center may be used as the field office for this work.

1. Sufficient supply of electrical outlets and a minimum of one operational telephone outlet in each office space.
2. Four flat-top movable desks (44" x 30") with filing and lockable storage drawers.
3. Four office chairs.
4. One large waste basket and two office size waste baskets.
5. Three 4-drawer legal size, filing cabinets with locks.
6. Ten folding or stacking chairs.
7. Two tables (30" x 60").
8. One ten-pound Class ABC fire extinguisher.
9. One first aid kit meeting the minimum requirements of ANSI/ISEA Z30S.1 (10 person ANSI First Aid Kit by Genuine First Aid® or equal.
10. One 16 ounce eyewash station.
11. One refrigerator with freezer (minimum 5-cubic-feet capacity).
12. One all-in-one (printer, copies, fax, scanner), Hewlett-Packard Model No. L 77S0 or equal.
13. Two cordless telephones with digital answering systems.

B. Agency field office will be collocated with the Engineer

C. Maintenance of the office area shall include telephone services and janitorial services not less than weekly. All garbage, dust, and miscellaneous material collected during clean-up of the facilities shall be disposed of at a sanitary landfill.

D. Maintain temporary fencing at the locations shown on the Contract Documents.

1. Existing fencing on the Site is shown on the Contract Drawings. Protect this security fencing from damage and repair and replace fencing damaged by Contractor's activities.

PART 3 EXECUTION

3.1 PERSONNEL DECONTAMINATION

A. Comply with all requirements of Site Specific Contractor Health and Safety Plan.

B. Provide the means for National Grid and the CM/Engineer to comply with Site Specific Contractor Health and Safety Plan.

C. Provide a personnel decontamination station within the Work Zone where personnel can drop equipment and remove personal protective equipment (PPE).

D. Equip decontamination station with basins for water and detergent and trash bags or cans for containing disposable PPE and other discarded materials.

3.2 EQUIPMENT DECONTAMINATION

A. Equipment deemed impacted by the CM/Engineer will be decontaminated as directed by the CM/Engineer

B. Any wastewater or other materials resulting from equipment decontamination will be properly stored and disposed.

3.3 EQUIPMENT LEFT ON SITE

A. Secure all vehicles and/or equipment left on the Site outside of the standard work hours.

B. Ensure that all equipment, where feasible, is de-energized when left on-Site and not in use to prevent electrical/fire/explosive hazards. Contractor will be responsible for security, operation and maintenance of any systems that require such services outside standard work hours. If systems are operational outside the standard work hours, provide oversight at all times when equipment is in operation or provide an electronic monitoring system with remote communication ability in the event of system failure. Repair system failures such that the Project schedule is not affected.

3.4 SITE SECURITY

A. Take every security precaution necessary to prevent any unauthorized access to the Work area, and to control construction traffic to and from the Site.

B. Establish written Site security procedures as part of the Site Operations Plan. At a minimum the procedures will include:

1. Roles and responsibilities of personnel involved with Site security.

2. Description of proposed daily security operations.
3. Method and frequency for conducting security checks.
4. Sign in/sign out procedures.
5. Location of security station.
6. Description of how a breach of security will be handled.
    a. A breach of security includes, but not be limited to, unauthorized personnel located on the Site working area, unauthorized personnel attempting to gain access to the Site working area, broken fences and unlocked gates, and unauthorized personnel in the hazardous work zones.
7. Communications.
8. List of personnel to be contacted in case of emergency.

3.5 ENVIRONMENTAL PROTECTION

A. For the purposes of this specification, environmental protection is defined as the retention of the environment in its natural state to the greatest extent possible during construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air, water, and land resources and involves noise, solid waste management, and management of other pollutants. Comply with all applicable or relevant and appropriate Federal, State, and local laws to provide for abatement and control of any environmental pollution arising from the construction activities in performance of the Work.

B. The CM/Engineer may notify the Contractor in writing of any non-compliance with Federal, State, and/or local laws. After receipt of the notice, immediately inform the CM/Engineer of the proposed corrective action and take such actions, if they are approved by the CM/Engineer. If the Contractor fails or refuses to comply promptly, the CM/Engineer may issue an order suspending or halting all or parts of the Work until satisfactory corrective action has been taken. Claims for extensions of time, or for excess costs or damages by the Contractor due to the stop orders described above, will be denied.

C. Do not pollute any stream, river, waterway, roadway, or soil with fuel, oil, grease, lubricant, hydraulic fluid, bitumen, calcium chloride, acid, base, or other harmful materials. Comply with the appropriate Federal, State, and local regulations and guidelines for the handling and disposal of all materials.

D. Properly dispose any debris resulting from the performance of the Work. Disposing of any debris, soil, water, effluent, by product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, or other harmful material etc., in or adjacent to the Project area is not acceptable. Remove any unauthorized dumped materials and restore the area as directed by the

CM/Engineer. If necessary, contaminated areas as a result of unauthorized activity or dumping by the Contractor will be remediated or excavated at no additional cost.

E. Dispose of all contaminated materials (debris, soil, water, effluent, by-product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, used erosion controls, or other harmful material etc.) resulting from the Work in accordance with all applicable or relevant and appropriate Federal and State laws prior to completion of construction.

END OF SECTION 01 50 00

SECTION 01 56 00
TEMPORARY ENCLOSURE

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, materials, and performing all operations required for providing a temporary enclosure during all MGP Holder contents related excavation operations.

1.2. SUBMITTALS

A. Furnish an enclosure design package that has been signed and sealed by an engineer licensed to practice in the State of New York that, at a minimum, includes the following elements:

1. A calculation package with material values, critical assumptions, and loading conditions.
2. Drawings for the membrane, framework, and anchoring system with appropriate details.
3. Description of the air handling system, to include:
    a. Equipment list with rated capacities.
    b. Layout diagram showing location of system components in the temporary enclosure.
    c. Primary and backup power supply.
    d. Filter media and estimated change out frequency.
    e. Method and location of disposal or recycling of filter media.

B. Submit the temporary enclosure manufacturer with the list of Subcontractors as part of the Site Operations Plan.

C. Provide results of all tests and inspections relative to the temporary enclosure as part of the Daily Report, when applicable.

1.3. DESIGN REQUIREMENTS

A. Comply with all federal, state, county, and local rules and regulations relative to the construction of temporary enclosures.

B. Design the temporary enclosure to be in compliance with all applicable local codes including, but not limited to, the following:

1. Building Codes.
2. Electrical Codes.

C. If the temporary enclosure will employ an anchorage system. Make arrangements for an independent testing agency to perform a pull test up to the design load on each anchor, or design the anchorage system with a factor of safety of 1.3 against pullout.

D. Provide the results of pull tests to the CM/Engineer, if performed.

1.4. DESIGN LOADS

A. Design the architectural membrane to provide the structural capacity to meet or exceed the roof snow load requirements for the City of Troy, New York.

1. This requirement may be waived if the Work is not expected to take place during the winter. Submit a written request to the CM/Engineer seeking a waiver of this requirement if snow loading is not anticipated while the temporary enclosure erected is on-Site.

B. Design the structure to withstand sustained wind velocities as required by the local building codes.

1.5. SETBACK FROM EXISTING BULKHEAD

A. Ensure that any equipment exceeding 4 tons does not traverse or operate within a 40 feet setback from the existing bulkhead.

B. Construct the Temporary Enclosure a minimum distance of 40 feet from the existing bulkhead.

PART 2 PRODUCTS

2.1. GENERAL MATERIAL REQUIREMENTS

A. Furnish materials suitable for their intended use and that conform to all applicable codes and standards.

B. Submit the proposed structure dimensions to the CM/Engineer as part of the design package. The structure must be large enough to accommodate the Work while maintaining the required setback of 40 feet from the existing bulkhead. The CM/Engineer reserves the right to request that a different sized structure be provided based on available space on-Site and the Contractors proposed means and methods.

C. Furnish a stressed membrane structure consisting of galvanized steel or aluminum framework of arched ribs, which supports a durable all-weather fabric membrane. Equip the structure with roll-up bay doors, pedestrian doors, and adequate interior lighting.

D. Provide a self-supporting structure with no exterior guy rope, cables, or horizontal purlins.

E. Use trusses that will support the installation of electrical and mechanical equipment, as needed.

2.2. MEMBRANE

A. Use a UV resistant and flame-retardant membrane fabric.

B. Tension the membrane with load-tested tie downs.

2.3. STEEL MEMBERS AND CONNECTIONS

A. Provide steel components with adequate strength to meet the calculated loading conditions.

B. Use structural members that have been treated to resist corrosion.

C. Do not weld steel components on-Site without prior approval from the CM/Engineer.

2.4. TEMPORARY ENCLOSURE INTERIOR AIR HANDLING SYSTEM

A. Design, install and operate a vapor management system for the temporary enclosure that will allow Work to be performed within the structure in Level D personal protective equipment (as defined in OSHA 40 CFR 1910.120) that meets the following requirements:

1. Creates and maintains a negative pressure environment within the enclosure to capture and treat anticipated emissions prior to discharge to the atmosphere.

2. Processes air through vapor phase carbon or other Engineer accepted system to remove dust, odors, VOCs, and SVOCs.

3. Is compatible with the structural elements of the temporary enclosure.

4. Allows for the removal and replacement of the carbon or other filtration media on short notice to ensure continuous operation of the system.

B. Baffle air handling equipment to comply with the local noise ordinances.

PART 3 EXECUTION

3.1. GENERAL

A. Erect and maintain the enclosure for the duration of the Holder contents excavation Work.

B. Do not divert surface/stormwater towards adjacent properties to accommodate the installation of the structure.

C. Inspect the temporary enclosure as per the manufacturer’s recommendations. Immediately repair all tears, rips, and separations noted.

D. Maintain the temporary enclosure access and egress points in a closed position. Open the enclosure only long enough to allow workers and vehicles to enter and exit.

3.2. ERECTION

A. Erect the temporary structure as per the manufacturer's instructions.

B. Maintain a representative of the temporary enclosure manufacturer on-Site to oversee the erection process.

3.3. AIR HANDLING SYSTEM

A. Operate the air handling system continually when impacted materials are being stored, handled, or amended within the enclosure.

B. Monitor the interior of the temporary enclosure for dust, vapor, and odors. Modify the air handling system, as needed, for the protection of workers and to prevent odors from escaping the enclosure. The air treatment system shall remove air-borne chemical constituents and meet the performance standards below:

1. Total particulates shall be below 150 ug/cubic meter in the exhaust air outside the temporary fabric structure at all times.

2. Total organic vapors shall be below 5 ppm in the exhaust air outside the temporary fabric structure.

3. Total benzene concentrations shall be below 1 ppm in the exhaust air outside the temporary fabric structure.

4. There shall be no detectable MGP odors at the site perimeter.

C. Properly dispose of filtration and treatment media.

3.4. DISMANTLING

A. Remove the air handling system and dismantle the temporary enclosure after the Holder contents excavation portion of the Project has been completed.

B. Dismantle the temporary enclosure as per the manufacturer's instructions.

END OF SECTION 01 56 00

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Project completion covers the administrative and technical requirements for final cleaning, inspection, Project as-built documents, warranties, bonds, final payment, and other procedures for project closeout in accordance with Article 13.0 of the National Grid Standard Conditions.

1.2 CLOSEOUT PROCEDURES

A. Substantial Completion:

1. When the Contractor considers the Work or designated portion thereof to be at Substantial Completion, provide written notice, with a list of items to be completed or corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

2. The CM/Engineer will inspect to determine the status of completion.

3. Should the CM/Engineer determine that Work is not Substantially Complete, the CM/Engineer will notify Contractor in writing.

4. Within two (2) days of the notice provide a schedule for when all defects will be corrected and/or the Work completed for the CM/Engineer's review.

5. Upon the CM/Engineer's approval, remedy any deficient and/or incomplete Work and upon completion, notify the CM/Engineer. The CM/Engineer will re-inspect the Work for the purpose of Final Acceptance.

B. Project As Built Drawings:

1. Submit record surveys in electronic (.pdf and AUTOCAD 2012) format and provide 8 hard copies to the CM/Engineer. Record surveys include:

a. All information required in the preconstruction survey, to include a preconstruction bathymetric survey.

b. Bathymetric survey post-stone removal.

c. Bathymetric survey post-dredging.

d. Bathymetric survey post Aquatic filling.

e. Limits of excavation and fill of the holder.

f. Limits of capping (pre and post capping)

g. Location of all geotechnical installations (micropiles, secant piles, etc.).

h. Settlement monitoring points with a table of survey data taken throughout the project.

i. Benchmark coordinates and elevation

C. Provide copies of all Project records prior to demobilization including:

1. Manifests and bills of lading (for any materials that were disposed of).
2. Weight tickets
3. Testing results
4. Health and Safety reports
5. Copies of permits

D. Utility Relocation:

1. Submit written confirmation from the utility providers that all temporary relocated utilities have been restored to pre-remediation condition and that all temporary utility connection points have been restored to a suitable condition.

E. Permit Closeout:

1. Submit written confirmation that all permits have been closed with their governing authority and that any and all remaining fees have been paid in full.

F. Final Acceptance:

1. Submit written certification that confirms the following: Contract Documents have been reviewed, Work has been inspected, Work is complete in accordance with the Contract Documents including satisfactory compliance with performance guarantees, any previously noted deficiencies have been corrected or remediated, equipment has been tested in presence of the CM/Engineer, and Work is complete and ready for final inspection.
2. Submit evidence of final continuing insurance coverage, complying with insurance requirements, with the application for final payment.
3. The CM/Engineer will inspect Work to verify status of completion.
4. Should the CM/Engineer consider the Work to be incomplete or defective, the Contractor will be notified in writing identifying incomplete or defective Work.
5. Take immediate action to remedy incomplete and deficient Work and send written notice when Work is complete. The CM/Engineer will re-inspect Work to verify status of completion.

G. Final Payment:

1. Submit applicable for final payment after the final acceptance of the Work.
2. Identify total Contract amount, previous payments and the amount due.

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

3.1 POST CONSTRUCTION INSPECTION

A. Prepare the Site for Substantial Completion and Final Acceptance. Work includes record documents, cleaning the Site and administrative provisions.

B. After final cleaning and upon written notice from the Contractor that Work is complete, the CM/Engineer will make a preliminary inspection. The CM/Engineer will notify the Contractor in writing of defective and/or incomplete Work by generating a "punch list."

C. Upon receiving written notice from the CM/Engineer, remedy defects and/or incomplete Work to the satisfaction of the CM/Engineer at no additional cost in a time frame suitable to support the Project schedule.

D. Inform the CM/Engineer in writing after the items listed in the "punch list" are corrected or completed. Upon receipt of notice, CM/Engineer will make final inspection of the Project in the presence of the Contractor.

E. Should the CM/Engineer find the Work to be satisfactory, the Contractor will be allowed to make application for final payment in accordance with provisions of the Agreement. Should the CM/Engineer still find deficiencies and incomplete Work, the Contractor will be notified in writing of deficient and/or incomplete Work and requests for final payment will not be approved until such time that the Contractor has satisfactorily completed the required Work.

END OF SECTION 01 77 00

SECTION 02 11 00
SURVEYING

PART 1 SUMMARY

1.1. GENERAL

A. Employ a Professional Land Surveyor in the State of New York as the Project Surveyor to provide survey services during all phases of construction, qualified in marine hydrographic surveying, to assure compliance with Specifications and Drawings.

B. Retain the same Project Surveyor for the duration of Work.

1.2. SUBMITTALS

A. Complete and submit all submittals in accordance with Section 01 33 00 - Submittal Procedures.

B. Submit copies of all field notes and field computations to the Engineer as part of Daily Progress Reports described in Section 01 30 00 Administrative Requirements. Submit upon request of the Engineer all computations, data, and other survey records used for the purposes of layout of the Work, or payment quantity estimation, or for final documentation of the Work.

C. Submit electronic plans (.pdf and AUTOCAD 2012 formats) and duplicate signed, hardcopy plans of each individual baseline, interim, or as-built survey as indicated in individual Sections and in Table 01 33 00-1: Submittals Summary Table.

1.3. EXAMINATION

A. Prior to starting Work, verify locations of survey benchmarks shown on the Drawings.

B. Promptly notify the Engineer of any discrepancies discovered in the survey benchmarks.

C. Conduct a preconstruction survey to include:

a. Benchmark coordinates and elevations.

b. Locations of monitoring wells within 50-feet of the bulkhead.

c. Above ground utilities, and utility mark outs from the DIGSAFE within 50-feet of the bulkhead wall.

d. All permanent structures within the work area.

e. Establish settlement monitoring points on the top of the bulkhead as shown on the drawings.

f. All information required in the preconstruction survey.

1.4. SURVEY REFERENCE POINTS

A. Established horizontal control points and benchmarks shall be flagged for protection during construction. Additional control points shall be established from control shown on the plans and documented to the satisfaction of the Engineer.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1. GENERAL SURVEY REQUIREMENTS

A. The Work shall be executed in conformance with the lines and grades shown on the Drawings, unless otherwise approved by the Engineer.

B. Promptly report to the Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons. Make no replacement or changes without prior written notice to the Engineer.

C. Survey using total station and to the following measurement tolerances: horizontal locations +/- 0.05 feet and vertical elevations +/- 0.01 feet.

D. Maintain complete and accurate log of control and survey work as Work progresses, and maintain a copy of log on Work Site at all times.

E. Surveying personnel shall be in full compliance with all requirements of the Contractor's Health and Safety Plan before entering the Work Site.

3.2. HYDROGRAPHIC SURVEY REQUIRMENTS

A. Establish and maintain a fixed tide gauge referenced to the established datum, at a suitable location to allow for adjustments to echo-sounding measurements. Tide level readings shall be made at 15 minute increments or less during all echo sounding measurements.

B. Survey for Filling and Capping using echo-sounding and land surveying methods to the following measurement tolerances: horizontal locations +/- 0.1 feet and vertical elevations +/- 0.1 feet. Soundings shall be taken in parallel lines at 20 foot intervals perpendicular to the bulkhead.

C. Use a sounding pole with a leveling rod and bottom plate to calibrate echo-sounding readings before and after each session. One echo sounding line shall be run perpendicular to the sounding lines to confirm elevations.

D. Use Survey Control Points shown on the Drawings to establish minimum measurement frequency for dredging and capping.

E. Material lift thickness will be measured after each lift.

F. Final elevations of each fill material will be surveyed and recorded.

3.3. GEOTECHNICAL SURVEY REQUIREMENTS

A. Surveyor will survey geotechnical monitoring points at the locations and frequency specified in Section 31 09 00.

B. Surveyor will locate installation locations and as-built locations of all geotechnical work (micropiles, secant piles, etc.) per the applicable specifications.

3.4. MEASUREMENT OF QUANTITIES

A. Compute material volumes using surveyed areas and differences in surveyed elevations.

END OF SECTION 02 11 00

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the partial or complete removal, storage, and/or disposal or salvage of structures, at grade, above grade, and below grade during performance of the Work.

1.2 SUBMITTALS

A. None

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

A. Remove existing fencing, structures and appurtenances from the Site as detailed in the Contract Documents.

B. Perform work in a matter that maximizes salvage and recycling of materials.

C. Monitoring wells that do not need to be protected by the Contractor will be abandoned by others in accordance with the NYSDEC CP-43 Groundwater Monitoring Well Decommissioning Policy, dated November 3, 2009.

D. Relocate existing above ground tank adjacent to Holder removal area.

E. Demolish in-place part of Holder wall as needed to construct the Access Road detailed in the Contract Drawings. Remove contents of Holder before demolishing the Holder wall.

F. Demolish west secant-pile guide wall per Construction Sequence Steps Drawing G3.

G. Demolish existing sheet pile wall per Construction Sequence Steps Drawing G3.

3.2 DEBRIS HANDLING

A. Store demolished materials on a debris pad, or in a container designed for the purpose.

B. Dispose of any debris in accordance with the Contract Drawings and Section 02 61 00 – Removal and Disposal of Contaminated Materials.

3.3 DEMOLITION OF REMNANT STRUCTURE AND ABANDONED PIPES

A. Where structures are partially demolished, employ means (saw cutting, pre-splitting, etc.) to maintain the integrity of the portion of the structure to remain in place.

B. On-Site crushing will not be allowed.

END OF SECTION 02 41 00

SECTION 02 61 00
REMOVAL AND DISPOSAL OF CONTAMINATED MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for the proper management, off-Site transportation, and disposal of waste materials and waste liquids generated during implementation of the Remedial Action.

1.2 GENERAL

A. The National Grid list of approved thermal desorption facilities for the receipt of soil and sediment from the Project Site are as follows:

1. ESMI of New York, 304 Towpath Road, Fort Edward, New York 12828 (800) 511-3764.

2. ESMI of New Hampshire, 67 International Drive, Loudon, New Hampshire 03307 (603) 783-0228.

B. The National Grid list of approved landfill facilities for receipt of soil and sediment from the Project Site are as follows:

1. Colonie Landfill, 1319 New Loudon Road, Cohoes, NY (518) 783-2845

C. The National Grid list of approved facilities for receipt of pre-treated wastewater from the Project Site are as follows:

1. Hudson River in accordance with SPDES Permit Equivalent.

1.3 SUBMITTALS

A. Designate and submit primary and alternate thermal desorption receiving facilities, liquid waste treatment facilities, and landfill receiving facilities for materials (soils, dredge spoils, solid waste, debris, and liquid waste). Upon final approval from National Grid, contract with all facilities prior to any excavation. Copies of accepted waste profiles and contracts from each facility or letters from each facility-indicating acceptance of the total estimated volume of material from this Project shall be submitted to the CM/Engineer.

B. Submit copies of all waste manifests, bills of lading, and certified weight slips from a scale approved for use by the CM/Engineer and/or National Grid for all materials removed from the Site for disposal.

C. Submit copies of Part 364 Permits for all waste transporters.

PART 2 MATERIALS

2.1 VEHICLE REQUIREMENTS

A. Vehicles used for the transport of materials shall be structurally sound and watertight to prevent leakage or spillage. All trucks must have a gasket seal on the back truck gate (that is in serviceable condition) and all tarps should have a flap (in serviceable condition, with proper grommets and holes) that covers the back top gap of the truck that can be secured via bungee cord or other CM/Engineer-approved methods. If trucks are not equipped as such, plastic must be placed on top of the soils before the tarp is lowered so that soils and/or odors that might escape from the back of the truck are minimized and the material is protected from rain during transit.

B. Properly affix license plates on the truck and remain visible at all times.

C. Display proper placards and cover or remove extraneous or incorrect placards prior to the truck departing the Site.

D. Display or have required permits readily available for verification by the CM/Engineer.

E. Drivers must remain in the truck at all times unless they are wearing the correct personal protective equipment required for the Site.

F. The CM/Engineer reserves the right to reject vehicles that are not properly equipped and/or require the use of plastic sheeting if the gasket seal and flaps are not considered by the CM/Engineer or National Grid to be in serviceable condition.

2.2 IMPACTED MATERIAL STORAGE

A. Vehicles and storage containers utilized for the storage and/or transport of impacted materials will be structurally sound and tight to prevent leakage or spillage of materials.

B. Vehicles and containers utilized for the storage and/or transport of materials will be provided with solid sealable covers to minimize the release of odors from the containers during transport.

C. Provide impermeable liners for the interior of the excavated impacted material storage containers and vehicles to prevent leakage of entrained liquid. The liner material will be strong enough to withstand the placement of excavated material into the container without tearing, and chemically resistant to the contaminants within the material.

2.3 ODOR SUPPRESSANT

A. Provide odor and dust suppressing foam to supplement covers, as requested by the CM/Engineer.

PART 3 EXECUTION

3.1 LOADING AND TRANSPORTATION OF MATERIAL

A. Trucks must arrive on-site clean. The CM/Engineer may instruct a truck to depart the Site if it arrives in a dirty condition.

B. Do not stand on the back of the truck. Use ladders or scaffolding when securing tarps and/or covers.

C. Use pre-characterization sample results to allow direct load, transport, and disposal of all MGP-related impacted material whenever possible.

D. Provide traffic control at the Site entry to ensure a smooth flow of traffic and to minimize congestion at the Site entrance. At a minimum, the traffic control must include the usage of flaggers and proper signage.

E. Appropriately cover trucks (see Section 2.1) filled with excavated material prior to exiting the Site to prevent vapor and fugitive dust emissions during transport. Supplement with odor suppressant foam or solvent as needed. Gross vehicle truck weights shall conform to the most current DOT regulations for the Federal, State, and local level.

F. All Work in and around trucks shall be performed in appropriate personal protective equipment. These activities must be specifically addressed in the Site Specific Contractor HASP.

G. Prior to leaving the Site, inspect all material transport vehicles and containers for evidence of contamination (including inside of wheels and undercarriage). All trucks leaving the Site shall proceed to a decontamination station for cleaning prior to exiting onto public roads.

1. Brush off equipment using a broom and/or brushes within the excavation area prior to movement to the decontamination pads to decrease the amount of respirable particulates leaving the remediation area.

2. If necessary, at the decontamination pad, all heavy equipment will be pressure washed before leaving the Site.

3. All equipment leaving the Site will be decontaminated per these guidelines. In addition, any equipment previously utilized to excavate impacted material will be decontaminated prior to use in backfilling (e.g. excavator bucket).

4. Size decontamination pads to ensure that the largest piece of Contractor equipment can be adequately decontaminated. Provisions will be made to control overspray at the decontamination pads.

5. Collect and pump wastewater from equipment decontamination into frac tank(s).

6. Wastewater will be transported from the Site by a properly licensed liquid waste hauler or pre-treated and discharged to a designated sanitary sewer manhole on or adjacent to the site following approval by the County.

7. Soils collected from the decontamination pads will be bulked with the MGP-related impacted material and sent to the properly licensed National Grid-approved disposal facility, as necessary.

H. Trucks shall proceed directly to the designated thermal desorption facility.

I. The Contractor is responsible for any and all actions necessary to remedy situations involving material spilled or leaked in transit, or mud or dirt tracked off-Site. This includes trucks carrying imported fill or other materials to the Site (i.e. dust generated from trucks entering the Site on adjacent roads). Clean up shall be performed in accordance with all applicable Federal, State, and local regulations at no additional costs to National Grid.

J. All transporters used shall be properly licensed, permitted, and certified for the service provided.

K. Material from the Site will not be combined with any other material, without the CM/Engineer's approval.

L. National Grid or the CM/Engineer will sign transport bills of lading or manifests. National Grid will provide a hazardous waste generator number, if required. Maintain copies of all documents involving transportation of materials from the Site. Copies of these records shall be submitted to the CM/Engineer at a frequency agreed to by the Contractor and National Grid. All records shall be turned over to National Grid at the completion of the Work.

M. Ensure that transport vehicles are properly secured, labeled, and placarded prior to exiting the Site.

3.2 DISPOSAL OF MATERIALS

A. Dispose of soils and dredge spoils that contain MGP-related impacted material at an off-Site licensed thermal desorption facility approved by National Grid, unless otherwise specified.

B. In the event that material cannot be thermally desorbed, notify National Grid in writing that the material must be disposed of as non-hazardous waste at a Subtitle D landfill or as hazardous waste at a Subtitle C landfill.

C. After notification that soils or dredge spoils cannot be thermally desorbed, National Grid will provide a list of approved landfill facilities.

D. Dispose of debris to an off-Site licensed landfill receiving Construction & Debris facility approved by National Grid, unless otherwise specified.

E. The Contractor is responsible for the characterization, laboratory testing, profiling, and acceptance of all materials to be disposed of at the designated disposal facilities. In the event that the identified and approved facilities cease to accept the materials, the Contractor will be responsible for identifying alternate facilities, and making arrangements with such facilities to accept material from

the Site with no change in the unit price submitted in the Contractor's Bid for this Project. Alternate facilities are subject to review and approval by National Grid.

F. In the event that an alternate facility is needed to accept the material, the Contractor will supply a written submission to National Grid on the material type, amount, location, and reason the approved facility ceased to accept the material. Alternate facilities not previously audited by National Grid will require an audit prior to allowing transport of materials to the facility. Any charges or fees incurred by the Contractor associated with delays to the Project schedule during this audit process are the responsibility of the Contractor.

G. If any materials are encountered during excavation that appear to exhibit hazardous characteristics these materials should be segregated, stored on Site, sampled, and disposed of appropriately.

H. Decontaminate construction debris and/or bulky material within the excavation, if encountered, if possible.

I. Segregate non-contaminated construction debris and bulky wastes for transport to a landfill facility.

J. Dispose of decontamination wastewater at an off-Site liquid waste treatment facility approved by National Grid or pre-treat and discharge wastewater to a designated discharge point in accordance with the SPDES Wastewater Discharge Permit Equivalent.

K. Liquid material collected in the wastewater treatment system which is not acceptable for discharge, such as NAPL, shall be adsorbed to solid adsorbent material and disposed of with other impacted solids to the thermal desorption facility.

L. Solid material collected in the dewatering frac tank(s), as a result of settling in the tank, shall be bulked with the suspected MGP-related impacted material and sent to the thermal desorption facility and/or landfill as necessary.

END OF SECTION 02 61 00

SECTION 03 11 13.00 10
STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 347 (2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1995; R 2004) Basic Hardboard

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA L870 (2010) Voluntary Product Standard, PS 1-09, Structural Plywood

ASTM INTERNATIONAL (ASTM)

ASTM C1077 (2013) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM C31/C31M (2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C39/C39M (2012) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

1.2 SYSTEM DESCRIPTION

A. The design, engineering, and construction of the formwork is the responsibility of the Contractor. Design formwork in accordance with methodology of ACI 347 for anticipated loads, lateral pressures, and stresses, and capable of withstanding the pressures resulting from placement and vibration of concrete. Comply with the tolerances specified in Section 03 31 01.00 10 CAST-IN-PLACE CONCRETE, paragraph CONSTRUCTION TOLERANCES. However, for surfaces with an ACI Class A surface designation, limit the allowable deflection for facing material between studs, for studs between walers and walers between bracing to 0.0025 times the span. Design the formwork as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. Monitor the adequacy of formwork design and construction prior to and during concrete placement as part of the Contractor's approved Quality Control Plan. Submit design analysis and calculations for form design and methodology used in the design.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Shop Drawings

a. Formwork

2. Product Data

a. Design

b. Form Materials

c. Form Releasing Agents

1.4 QUALITY ASSURANCE

A. Sample Panels shall be of sufficient size to contain joints and shall be not less than 6 feet long and 4 feet wide. The panels shall be of typical wall thickness and constructed containing the full allocation of reinforcing steel that will be used in the structure, with the forming system that duplicates in every detail the one that will be used in construction of the structure. Use the same concrete mixture proportion and materials, the same placement techniques and equipment, and the same finishing techniques and timing that are planned for the structure. Construction of Class A finish will not be permitted until sample panels have been approved. Protect sample panels from construction operations in a manner to protect approved finish, and are not to be removed until all Class A finish concrete has been accepted. After shop drawings have been reviewed, submit sample panels for Class A finish with applied architectural treatment; panels shall be built on the project site where directed.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Submit manufacturer's data, including literature describing form materials, accessories, and form releasing agents.

2.2 FORMS FOR CLASS A FINISH

A. Forms for Class A finished surfaces shall be plywood panels conforming to APA L870, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for round columns shall be the prefabricated seamless type.

2.3 FORMS FOR CLASS B FINISH

A. This class of finish shall apply to all surfaces except those specified to receive Class A, Class C, or Class D. Forms for Class B finished surfaces shall be

plywood panels conforming to APA L870, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for round columns shall be the prefabricated seamless type. Steel lining on wood sheathing will not be permitted.

2.4 FORMS FOR CLASS C FINISH

A. Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to APA L870, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard conforming to AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used. Forms for round columns may have one vertical seam.

2.5 FORMS FOR CLASS D FINISH

A. Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.6 FORM TIES

A. Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Provide solid backing for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter. Terminate the embedded portion of metal ties not less than 2 inches from any concrete surface exposed to water. Removable tie rods shall be not more than 1-1/2 inches in diameter. Plastic snap ties may be used in locations where the surface will not be exposed to view.

2.7 FORM RELEASING AGENTS

A. Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. If special form liners are to be used, follow the recommendation of the form coating manufacturer. Submit manufacturer's recommendation on method and rate of application of form releasing agents.

PART 3 EXECUTION

3.1 INSTALLATION

A. Formwork

1. Forms shall be constructed true to the structural design and required alignment. Forms shall be mortar tight, properly aligned and adequately

supported to produce concrete surfaces meeting the surface requirements specified in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE and conforming to construction tolerance given in TABLE 1. Continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface class specified. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of mortar and any other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker. Submit drawings showing details of formwork, including dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

3.2 CHAMFERING

A. All exposed joints, edges and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated twelve inches outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.3 COATING

A. Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 FORM REMOVAL

A. Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and

amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. In any case forms shall not be removed unless the minimum compressive strength requirements below are met, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Form removal shall be scheduled so that all necessary repairs can be performed. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C31/C31M and ASTM C39/C39M at the expense of the Contractor by an independent laboratory that complies with ASTM C1077 and shall be tested within 4 hours after removal from the site.

3.5 FORMWORK NOT SUPPORTING WEIGHT OF CONCRETE

A. Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed. If forms are to be removed in less than 24 hours on formwork not supporting the weight of concrete, submit the evaluation and results of the control cylinder tests shall be submitted to and approved before the forms are removed.

3.6 FORMWORK SUPPORTING WEIGHT OF CONCRETE

A. Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. As a minimum, forms shall be left in place until control concrete test cylinders indicate evidence the concrete has attained at least 70 percent of the compressive strength required for the structure in accordance with the quality and location requirements.

3.7 TUNNEL FORMS

A. Tunnel lining bulkhead forms shall not be removed in less than 12 hours and tunnel lining forms in not less than 16 hours.

3.8 INSPECTION

A. Forms and embedded items shall be inspected in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing. Submit field inspection reports for concrete forms and embedded items.

TABLE 1 TOLERANCES FOR FORMED SURFACES	
1. Variations from the plumb:	
a. In the lines and surfaces of columns, piers, walls and in arises	1/4 inch in any 10 feet of length Maximum for entire length -- 1 inch
b. For exposed corner columns, control-joint grooves, and other conspicuous lines	1/4 inch in any 20 feet of length Maximum for entire length -- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	
a. In slab soffits, ceilings beam soffits, and in arises, measured before removal of supporting shores	1/4 inch in any 10 feet of length 3/8 inch in any bay or in any 20 feet of length Maximum for entire length -- 3/4 inch
b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	1/4 inch in any bay or in any 20 feet of length Maximum for entire length -- 1/2 inch
3. Variation of the linear building lines from established position in plan	1/2 inch in any 10 feet 1 inch maximum
4. Variation of distance between walls, columns, partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay, and not more than 1 inch total variation
5. Variation in the sizes and locations of sleeves, floor openings, and wall opening	Minus 1/4 inch, Plus 1/2 inch
6. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls	Minus 1/4 inch, Plus 1/2 inch
7. Footings:	

TABLE 1 TOLERANCES FOR FORMED SURFACES	
a. Variation of dimensions in plan	Minus 1/2 inch, plus 2 inches when formed or plus 3 inches when placed against unformed excavation
b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 2 inches
c. Reduction in thickness	Minus 5 percent of the specified thickness
8. Variation in steps:	
a. In a flight of stairs	Riser -- 1/8 inch Tread -- 1/4 inch
b. In consecutive steps	Riser -- 1/16 inch Tread -- 1/8 inch

END OF SECTION 03 11 13.00 10

SECTION 03 15 00.00 10
CONCRETE ACCESSORIES 8/10

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 111	(2011) Standard Method of Test for Mineral Matter or Ash in Asphalt Materials

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM C919	(2012) Use of Sealants in Acoustical Applications
ASTM C920	(2011) Standard Specification for Elastomeric Joint Sealants
ASTM D1751	(2004; R 2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D2628	(1991; R 2011) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2012) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D4	(1986; R 2010) Bitumen Content
ASTM D412	(2006a; R 2013) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	(2012a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D5249	(2010) Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D6/D6M	(1995; E 2011; R 2011) Loss on Heating of Oil and Asphaltic Compounds

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 513 (1974) Corps of Engineers Specifications for Rubber Waterstops

COE CRD-C 572 (1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Shop Drawings
   a. Waterstops
2. Product Data
   a. Preformed Expansion Joint Filler
   b. Sealant
   c. Waterstops
3. Samples
   a. Lubricant for Preformed Compression Seals
   b. Field-Molded Type
   c. Non-metallic Materials
   d. Waterstops
   e. Splicing Waterstops
4. Certificates
   a. Preformed Expansion Joint Filler
   b. Sealant
   c. Waterstops

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect material delivered and placed in storage off the ground from moisture, dirt, and other contaminants. Deliver sealants in the manufacturer's original unopened containers. Remove sealants from the site whose shelf life has expired.

PART 2 PRODUCTS

2.1 CONTRACTION JOINT STRIPS

A. Contraction joint strips shall be 1/8 inch thick tempered hardboard conforming to AHA A135.4, Class 1. In lieu of hardboard strips, rigid polyvinylchloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce

controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

2.2 PREFORMED EXPANSION JOINT FILLER

A. Expansion joint filler shall be preformed material conforming to ASTM D1751or ASTM D1752, Type I, or resin impregnated fiberboard conforming to the physical requirements of ASTM D1752. Submit certified manufacturer's test reports for premolded expansion joint filler strips, compression seals and lubricant, and metallic waterstops to verify compliance with applicable specification. Unless otherwise indicated, filler material shall be 3/4 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D5249.

2.3 SEALANT

A. Joint sealant shall conform to the following:

2.4 PREFORMED POLYCHLOROPRENE ELASTOMERIC TYPE

A. ASTM D2628.

2.5 LUBRICANT FOR PREFORMED COMPRESSION SEALS

A. ASTM D2835. Submit a piece not less than 9 ft of 1 inch nominal width or wider seal or a piece not less than 12 ft of compression seal less than 1 inch nominal width. Provide one quart of lubricant.

2.6 FIELD-MOLDED TYPE

A. ASTM C920. Sealant shall be Type M, Grade P or NS, Class 25, Use T for horizontal joints. Type M, Grade NS, Class 25, Use NT for vertical joints. Except, the joint sealant that will be submerged underwater for part or all of its service life shall meet the requirements of USE I. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with sealant, and non-absorptive material type such as extruded butyl or polychloroprene rubber. Submit One gallon of field-molded sealant and one quart of primer (when primer is recommended by the sealant manufacturer) identified to indicate manufacturer, type of material, quantity, and shipment or lot represented.

2.7 WATERSTOPS

A. Shop fabricate intersection and change of direction waterstops. Submit a sample of each material consisting of a piece not less than 12 inches long cut from each 200 feet of finished waterstop furnished, but not less than a total of 4 linear feet of each type and size furnished. For spliced segments of waterstops to be installed in the work, furnish one spliced sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site for inspection and testing. Make the spliced samples using straight run pieces with the splice located

at the mid-length of the sample and finished as required for the installed waterstop. The total length of each spliced sample shall be not less than 12 inches long. Submit waterstop materials and splice samples for inspection and testing identified to indicate manufacturer, type of material, size and quantity of material and shipment represented.

2.8 NON-METALLIC MATERIALS

A. Non-metallic waterstops shall be manufactured from a prime virgin resin; reclaimed material is not acceptable. The compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Rubber waterstops shall conform to COE CRD-C 513. Polyvinylchloride waterstops shall conform to COE CRD-C 572. Thermoplastic elastomeric rubber waterstops shall conform to ASTM D471. Submit a piece not less than 12 inch long cut from each 200 ft of finished waterstop furnished, but not less than a total of 4 ft of each type, size, and lot furnished. One splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site. Make the splice samples using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 12 inches long.

2.9 NON-METALLIC HYDROPHILIC

A. Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F shall be 3 to 1 minimum.

2.10 PREFORMED ELASTIC ADHESIVE

A. Produce preformed plastic adhesive waterstops from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, containing no solvents, asbestos, irritating fumes or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength.

2.11 CHEMICAL COMPOSITION

A. Meet the chemical composition of the sealing compound requirements shown below:

PERCENT BY WEIGHT			
COMPONENT	MINIMUM	MAXIMUM	TEST
Bitumen (Hydrocarbon plastic)	50	70	ASTM D4

PERCENT BY WEIGHT			
COMPONENT	MINIMUM	MAXIMUM	TEST
Inert Mineral Filler	30	50	AASHTO T 111
Volatile Matter		2	ASTM D6/D6M

2.12 ADHESION UNDER HYDROSTATIC PRESSURE

A. The sealing compound shall not leak at the joints for a period of 24 hours under a vertical 6 foot head pressure. In a separate test, the sealing compound shall not leak under a horizontal pressure of 10 psi which is reached by slowly applying increments of 2 psi every minute.

2.13 SAG OF FLOW RESISTANCE

A. Sagging shall not be detected when tested as follows: Fill a wooden form 1 inch wide and 6 inches long flush with sealing compound and place in an oven at 135 degrees F in a vertical position for 5 days.

2.14 CHEMICAL RESISTANCE

A. The sealing compound when immersed separately in a 5 percent solution of caustic potash, a 5 percent solution of hydrochloric acid, 5 percent solution of sulfuric acid and a saturated hydrogen sulfide solution for 30 days at ambient room temperature shall show no visible deterioration.

2.15 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Materials Tests

B. Field-Molded Sealants

1. Samples of sealant and primer, when use of primer is recommended by the manufacturer, as required in paragraph FIELD-MOLDED TYPE, shall be tested by and at the expense of the Owner for compliance with paragraph FIELD-MOLDED TYPE. If the sample fails to meet specification requirements, provide new samples and the cost of retesting will be deducted from payments due the Contractor.

C. Non-Metallic Waterstops

1. Samples of materials and splices will be visually inspected and tested by and at the expense of the Owner for compliance with COE CRD-C 513 or COE CRD-C 572 as applicable. If a sample fails to meet the specification requirements, provide new samples and the cost of retesting will be deducted from payments due the Contractor.

2.16 SPLICING WATERSTOPS

A. Procedure and Performance Qualifications

1. Demonstrate procedure and performance qualifications for splicing waterstops in the presence of the Engineer. Submit procedures for splicing waterstops for approval.

B. Non-Metallic Waterstops

1. Demonstrate procedure and performance qualifications for splicing non-metallic waterstops by the manufacturer at the factory and the Contractor at the job site by each making three spliced samples of each size and type of finished waterstop.

PART 3 EXECUTION

3.1 INSTALLATION

A. Joint locations and details, including materials and methods of installation of joint fillers and waterstops, shall be as specified and indicated. In no case shall any fixed metal be continuous through an expansion or contraction joint.

3.2 CONTRACTION JOINTS

A. Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Make joints 1/8 inch to 3/16 inch wide and extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

B. Joint Strips

1. Provide strips of the required dimensions and as long as practicable. After the first floating, groove the concrete with a tool at the joint locations. Insert the strips in the groove and depress them until the top edge of the vertical surface is flush with the surface of the slab. Float and finish the slab as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, saw out the top portion of the strip after the curing period to form a recess for sealer. Discard the removable section of PVC or HIPS strips and leave the insert in place. Maintain true alignment of the strips during insertion.

C. Sawed Joints

1. Saw joints early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent raveling of the edges of the saw cut. Cutting shall be completed before

shrinkage stresses become sufficient to produce cracking. Use concrete sawing machines that are adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Cut joints to true alignment and in sequence of concrete placement. Remove sludge and cutting debris. Form reservoir for joint sealant.

D. Bond Breaker

1. Coat joints requiring a bond breaker with curing compound or with bituminous paint. Protect waterstops during application of bond breaking material to prevent them from being coated.

3.3 EXPANSION JOINTS

A. Use preformed expansion joint filler in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. Extend the filler to the full slab depth, unless otherwise indicated. neatly finish the edges of the joint with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. Remove the wood strip after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. Thoroughly clean the groove of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust. If blowing out the groove use oil-free compressed air.

3.4 JOINT SEALANT

A. Fill sawed contraction joints and expansion joints in slabs with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Apply joint sealant as recommended by the manufacturer of the sealant.

B. Joints With Preformed Compression Seals

1. Install compression seals with equipment capable of installing joint seals to the prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal or concrete and with no more than 5 percent stretching of the seal. Cover the sides of the joint and, if necessary, the sides of the compression seal with a coating of lubricant. Coat butt joints with liberal applications of lubricant.

C. Joints With Field-Molded Sealant

1. Do not seal joints when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. When the sealants are meant to

reduce the sound transmission characteristics of interior walls, ceilings, and floors the guidance provided in ASTM C919 shall be followed. Coat joints requiring a bond breaker with curing compound or with bituminous paint. Install bond breaker and back-up material where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

3.5 WATERSTOPS, INSTALLATION AND SPLICES

A. Install waterstops at the locations shown to form a continuous water-tight diaphragm. Embed the bottom of each waterstop a minimum of 6 inches in firm rock or sealed to other cut-off systems. Make adequate provision to support and completely protect the waterstops during the progress of the work. Repair or replace any waterstop punctured or damaged. Protect exposed waterstops during application of form release agents to avoid being coated. Provide suitable guards to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Accomplish splices with certified trained personnel using approved equipment and procedures.

3.6 NON-METALLIC

A. Fittings shall be shop made using a machine specifically designed to mechanically weld the waterstop. A miter guide, proper fixturing (profile dependent), and portable power saw shall be used to miter cut the ends to be joined to ensure good alignment and contact between joined surfaces. The splicing of straight lengths shall be done by squaring the ends to be joined. Maintain continuity of the characteristic features of the cross section of the waterstop (ribs, tabular center axis, protrusions, etc.) across the splice.

B. Rubber Waterstop

1. Splices shall be vulcanized or shall be made using cold bond adhesive as recommended by the manufacturer. Splices for TPE-R shall be as specified for PVC.

C. Polyvinyl Chloride Waterstop

1. Make splices by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. Use the correct temperature to sufficiently melt without charring the plastic. Reform waterstops at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled, shall show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

D. Quality Assurance

1. Edge welding will not be permitted. Compress or close centerbulbs when welding to non-centerbulb type. Waterstop splicing defects which are unacceptable include, but are not limited to the following: 1) Tensile strength less than 80 percent of parent section. 2) Free lap joints. 3) Misalignment of centerbulb, ribs, and end bulbs greater than 1/16 inch. 4) Misalignment which reduces waterstop cross section more than 15 percent. 5) Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness. 6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of 1/2 inch in 10 feet. 7) Visible porosity in the weld area, including pin holes. 8) Charred or burnt material. 9) Bubbles or inadequate bonding. 10) Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

3.7 NON-METALLIC HYDROPHILIC WATERSTOP INSTALLATION

A. Miter cut ends to be joined with sharp knife or shears. The ends shall be adhered with cyanacryiate (super glue) adhesive. When joining hydrophilic type waterstop to PVC waterstop, the hydrophilic waterstop shall be positioned as shown on the drawings. Apply a liberal amount of a single component hydrophilic sealant to the junction to complete the transition.

3.8 PREFORMED PLASTIC ADHESIVE INSTALLATION

A. The installation of preformed plastic adhesive waterstops shall be a prime, peel, place and pour procedure. Joint surfaces shall be clean and dry before priming and just prior to placing the sealing strips. The end of each strip shall be spliced to the next strip with a 1 inch overlap; the overlap shall be pressed firmly to release trapped air. During damp or cold conditions the joint surface shall be flashed with a safe, direct flame to warm and dry the surface adequately; the sealing strips shall be dipped in warm water to soften the material to achieve maximum bond to the concrete surface.

3.9 CONSTRUCTION JOINTS

A. Treat construction joints coinciding with expansion and contraction joints as expansion or contraction joints as applicable.

END OF SECTION 03 15 00.00 10

SECTION 03 20 00.00 10
CONCRETE REINFORCING 8/10

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318	(2011; Errata 2011; Errata 2012) Building Code Requirements for Structural Concrete and Commentary
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A184/A184M	(2006; E2011) Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A36/A36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A370	(2012a) Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A615/A615M	(2012) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	(2007b) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A82/A82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A884/A884M	(2012) Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2009; 28th Ed) Manual of Standard Practice

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04	(2012) Seismic Design for Buildings

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Shop Drawings
   a. Reinforcement
2. Samples
   a. Epoxy-Coated Bars
3. Test Reports
   a. Material
   b. Tests, Inspections, and Verifications
4. Certificates
   a. Reinforcing Steel

1.3 DELIVERY, STORAGE, AND HANDLING

A. Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

A. Dowels shall conform to ASTM A36/A36M.

2.2 FABRICATED BAR MATS

A. Fabricated bar mats shall conform to ASTM A184/A184M.

2.3 REINFORCING STEEL

A. Reinforcing steel shall be deformed bars conforming to ASTM A615/A615M or ASTM A706/A706M grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A82/A82M.

B. Submit certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

2.4 EPOXY-COATED BARS

A. Epoxy-coated steel bars shall comply with the requirements of ASTM A775/A775M, including written certifications for coating material and coated bars, sample of coating material, and 1.5 pounds of patching material.

2.5 WELDED WIRE FABRIC

A. Welded wire fabric shall conform to ASTM A185/A185M. When directed by the Engineer for special applications, welded wire fabric shall conform to ASTM A884/A884M. For wire with a specified yield strength (fy) exceeding 60,000 psi, fy shall be the stress corresponding to a strain of 0.35 percent.

2.6 WIRE TIES

A. Wire ties shall be 16 gauge or heavier black annealed steel wire. Ties for epoxy-coated bars shall be vinyl-coated or epoxy-coated.

2.7 SUPPORTS

A. Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 10MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

B. Bar supports shall comply with the requirements of ACI SP-66. Supports for bars in concrete with formed surfaces exposed to view or to be painted shall be plastic-coated wire, stainless steel or precast concrete supports. Precast concrete supports shall be wedged-shaped, not larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and have an embedded hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view shall be the same quality, texture and color as the finish surfaces.

2.8 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Perform material tests, specified and required by applicable standards, by an approved laboratory and certified to demonstrate that the materials are in conformance with the specifications. Tests, inspections, and verifications shall be performed and certified at the Contractor's expense. Submit certified tests reports of reinforcement steel showing that the steel complies with the applicable specifications for each steel shipment and identified with specific lots prior to placement. Submit three copies of the heat analyses for each lot of steel furnished certifying that the steel conforms to the heat analyses.

2.9 REINFORCEMENT STEEL TESTS

A. Mechanical testing of steel shall be in accordance with ASTM A370 except as otherwise specified or required by the material specifications. Tension tests shall be performed on full cross-section specimens using a gage length that spans the extremities of specimens with welds or sleeves included. Chemical analyses of steel heats shall show the percentages of carbon, phosphorous, manganese, sulphur and silicon present in the steel.

PART 3 EXECUTION

3.1 REINFORCEMENT

A. Reinforcement steel and accessories shall be fabricated and placed as specified and shown and approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in accordance with ACI SP-66 and ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Zinc-Coated and epoxy-coated bars shall be mill-bent prior to coating. All steel shall be bent cold unless authorized. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms. Submit detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

3.2 PLACEMENT

A. Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.3 SPLICING

A. Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4/D1.4M. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches.

Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.4 PLACING TOLERANCES

A. Spacing

1. The spacing between adjacent bars and the distance between layers of bars may not vary from the indicated position by more than one bar diameter nor more than 1 inch.

B. Concrete Cover

1. The minimum concrete cover of main reinforcement steel bars shall be as shown. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER (inch)	VARIATION (inch)
6	plus 1/2
4	plus 3/8
3	plus 3/8
2	plus 1/4
1-1/2	plus 1/4
1	plus 1/8
3/4	plus 1/8

3.5 SPLICING

A. Splices in steel bars shall be made only as required. Bars may be spliced at alternate or additional locations at no additional cost to the Owner subject to approval.

1. Lap Splices

a. Lap splices shall be used only for bars smaller than size 14 and welded wire fabric. Lapped bars may be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire

surface of each bar in concrete. Lapped bars shall not be spaced farther apart than 1/5 the required length of lap or 6 inches.

3.6 WELDED-WIRE FABRIC PLACEMENT

A. Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated.

B. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

3.7 DOWEL INSTALLATION

A. Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

3.8 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

A. Special inspections and testing for seismic-resisting systems and components shall be done in accordance with UFC 3-310-04 and Section 01 45 35 SPECIAL INSPECTIONS.

END OF SECTION 03 20 00.00 10

SECTION 03 30 00.00 10
CAST-IN-PLACE CONCRETE 11/10

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 305.1	(2006) Specification for Hot Weather Concreting
ACI 318	(2011; Errata 2011; Errata 2012) Building Code Requirements for Structural Concrete and Commentary

ASTM INTERNATIONAL (ASTM)

ASTM C1017/C1017M	(2007) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1059/C1059M	(1999; R 2008) Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C1064/C1064M	(2011) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	(2013) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1107/C1107M	(2011) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143/C143M	(2012) Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C172/C172M	(2010) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2012) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C192/C192M	(2012a) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2010) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2012) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2013) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C78/C78M	(2012; E 2013) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C881/C881M	(2010) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C937	(2010) Grout Fluidifier for Preplaced-Aggregate Concrete
ASTM C94/C94M	(2013) Standard Specification for Ready-Mixed Concrete
ASTM D75/D75M	(2009) Standard Practice for Sampling Aggregates
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)	
NIST HB 44	(2013) Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(2000; R 2006) Concrete Plant Standards
NRMCA QC 3	(2011) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities
NRMCA TMMB 100	(2001; R 2007) Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 94	(1995) Corps of Engineers Specification for Surface Retarders

1.2 SYSTEM DESCRIPTION

A. Provide concrete composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.3 PROPORTIONING STUDIES

A. Trial design batches, mixture proportions studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Except as specified for flexural strength concrete, mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M.

1. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and be accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications.

2. Make trial mixtures having proportions, consistencies, and air content suitable for the work based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project.

3. The maximum water-cement ratios required in subparagraph Water-Cement Ratio below will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent.

4. Design laboratory trial mixtures for maximum permitted slump and air content. Make separate sets of trial mixture studies for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations.

5. Report the temperature of concrete in each trial batch. For each water-cement ratio, at least three test cylinders for each test age shall be made, cured in accordance with ASTM C192/C192M and tested at 7 and 28 days in accordance with ASTM C39/C39M. From these test results, plot a curve showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7 day and 28 day strengths. Design each mixture to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

6. Submit the results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. Accompany the statement with test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

1.4 AVERAGE COMPRESSIVE STRENGTH

A. The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, adjust the mixture, as approved, to bring the daily average back up to f'cr. During production, the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.5 COMPUTATIONS FROM TEST RECORDS

A. Where a concrete production facility has test records, establish a standard deviation in accordance with the applicable provisions of ACI 214R. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths (f'c) within 1,000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

f'cr = f'c + 1.34S where units are in psi

f'cr = f'c + 2.33S - 500 where units are in psi

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

1.6 COMPUTATIONS WITHOUT PREVIOUS TEST RECORDS

A. When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

1. If the specified compressive strength f'c is less than 3,000 psi,

   f'cr = f'c + 1000 psi

2. If the specified compressive strength f'c is 3,000 to 5,000 psi,

   f'cr = f'c + 1,200 psi

3. If the specified compressive strength f'c is over 5,000 psi,

   f'cr = f'c + 1,400 psi

1.7 TOLERANCES

A. Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117. Take level and grade tolerance measurements of slabs as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.8 STRENGTH REQUIREMENTS

A. Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
5000 psi at 28 days	Anchor Beam
4000 psi at 28 days	All other Locations
3000 psi at 28 days	N/A

B. Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C39/C39M. Flexural strength shall be determined in accordance with ASTM C78/C78M.

1. Evaluation of Concrete Compressive Strength. Fabricate compressive strength specimens (6 by 12 inch cylinders), laboratory cure them in accordance with ASTM C31/C31M and test them in accordance with ASTM C39/C39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or

exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

2. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, take steps to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C42/C42M. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Engineer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. Perform the coring and repair the holes; cores will be tested by the Owner.

3. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Engineer in accordance with the requirements of ACI 318. Concrete work evaluated by structural analysis or by results of a load test as being understrength shall be corrected in a manner satisfactory to the Engineer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and approved by the Engineer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Owner.

1.9 WATER-CEMENT RATIO

A. Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.40	None
0.45	All
0.50	None
0.55	None

B. These w/c's may cause higher strengths than that required above for compressive or flexural strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan.

1.10 AIR ENTRAINMENT

A. Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Concrete with specified strength over 5000 psi may have 1.0 percent less air than specified above. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C231/C231M.

1.11 SLUMP

A. Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C143/C143M.

Structural Element	Slump (inches)	
	Minimum	Maximum
Walls, columns and beams	2	4
Foundation walls, substructure walls, footings, slabs	1	3
Any structural concrete approved for placement by pumping:		
At pump	2	6
At discharge of line	1	4

B. When use of a plasticizing admixture conforming to ASTM C1017/C1017M or when a Type F or G high range water reducing admixture conforming to ASTM C494/C494M is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

1.12 CONCRETE TEMPERATURE

A. The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.13 SIZE OF COARSE AGGREGATE

A. Use the largest feasible nominal maximum size aggregate (NMSA), specified in PART 2 paragraph AGGREGATES, in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.14 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Product Data
    a. Portland Cement
    b. Ready-Mixed Concrete
    c. Vapor Barrier
    d. Latex Bonding Agent
    e. Floor Finish
    f. Floor Hardener
    g. Chemical Admixtures
    h. Epoxy Resin
2. Samples
    a. Surface Retarder
3. Design Data
    a. Mixture Proportions
4. SD-06 Test Reports

a. Testing and Inspection for CQC

5. SD-07 Certificates

a. Qualifications

1.15 QUALITY ASSURANCE

A. Submit qualifications for Contractor Quality Control personnel assigned to concrete construction as American Concrete Institute (ACI) Certified Workmen in one of the following grades or show written evidence of having completed similar qualification programs:

Concrete Field Testing Technician	Grade I
Concrete Laboratory Testing Technician	Grade I or II
Concrete Construction Inspector	Level II
Concrete Transportation Construction Inspector or Reinforced Concrete Special Inspector	Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Code Council (ICC), and Southern Building Code Congress International (SBCCI)
Foreman or Lead Journeyman of the flatwork finishing crew	Similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation

1.16 PRE-INSTALLATION MEETING

A. A pre-installation meeting with the Engineer will be required at least 10 days prior to start of construction. The Contractor is responsible for calling the meeting; the Project Superintendent and active installation personnel shall be present.

1.17 SPECIAL PROPERTIES AND PRODUCTS

A. Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.18 QUALITY ASSURANCE INSPECTION AND TESTING

A. Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Engineer can and

will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Owner's inspection or testing will not relieve the Contractor of any CQC responsibilities.

1. Materials

   a. The Owner will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D75/D75M. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

2. Fresh Concrete

   a. Fresh concrete will be sampled as delivered in accordance with ASTM C172/C172M and tested in accordance with these specifications, as considered necessary.

3. Hardened Concrete

   a. Tests on hardened concrete will be performed by the Owner when such tests are considered necessary.

4. Inspection

   a. Concrete operations may be tested and inspected by the Owner as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Owner for final acceptance.

1.19 DELIVERY, STORAGE, AND HANDLING

A. Store cement and other cementitious materials in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Store reinforcing bars and accessories above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

A. Cementitious Materials shall be portland cement, or portland cement in combination with pozzolan, conforming to appropriate specifications listed below. Restrict usage of cementitious materials in concrete that will have surfaces exposed in the completed structure so there is no change in color, source, or type of cementitious material.

2.2 PORTLAND CEMENT

A. ASTM C150/C150M, Type I low alkali with a maximum 15 percent amount of tricalcium aluminate, or Type II low alkali including false set requirements.

2.3 HIGH-EARLY-STRENGTH PORTLAND CEMENT

A. ASTM C150/C150M, Type III with tricalcium aluminate limited to 5 percent, low alkali. Use Type III cement only in isolated instances and only when approved in writing.

2.4 POZZOLAN (FLY ASH)

A. Pozzolan shall conform to ASTM C618, Class C or F, including low alkali multiple factor, drying shrinkage, uniformity, and severe sulfate resistance requirements in Table 3 of ASTM C618. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

2.5 AGGREGATES

A. Fine and coarse aggregates shall be tested and evaluated for alkali-aggregate reactivity in accordance with ASTM C1260. The fine and coarse aggregates shall be evaluated separately and in combination, which matches the Contractor's proposed mix design proportioning. All results of the separate and combination testing shall have a measured expansion less than 0.10 (0.08) percent at 16 days after casting. Should the test data indicate an expansion of 0.10 (0.08) percent or greater, the aggregate(s) shall be rejected or additional testing using ASTM C1260 and ASTM C1567 shall be performed. The additional testing using ASTM C1260 and ASTM C1567 shall be performed using the low alkali portland cement in combination with Class F fly ash. Class F fly ash shall be used in the range of 25 to 40 percent of the total cementitious material by mass.

1. Fine Aggregate

   a. Fine aggregate shall conform to the quality and gradation requirements of ASTM C33/C33M.

2. Coarse Aggregate

   a. Coarse aggregate shall conform to ASTM C33/C33M.

2.6 CHEMICAL ADMIXTURES

A. Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

1. Air-Entraining Admixture

a. ASTM C260/C260M and shall consistently entrain the air content in the specified ranges under field conditions.

2. Accelerating Admixture

a. ASTM C494/C494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

3. Water-Reducing or Retarding Admixture

a. ASTM C494/C494M, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

4. High-Range Water Reducer

a. ASTM C494/C494M, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

5. Surface Retarder

a. COE CRD-C 94. Submit sample of surface retarder material with manufacturer's instructions for application in conjunction with air-water cutting.

6. Expanding Admixture

a. Aluminum powder type expanding admixture conforming to ASTM C937.

7. Other Chemical Admixtures

a. Chemical admixtures for use in producing flowing concrete shall comply with ASTM C1017/C1017M, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.7 WATER

A. Water for mixing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.8 NONSHRINK GROUT

A. Nonshrink grout shall conform to ASTM C1107/C1107M, and shall be a commercial formulation suitable for the proposed application.

2.9 NONSLIP SURFACING MATERIAL

A. Provide nonslip surfacing material consisting of 55 percent, minimum, aluminum oxide or silicon-dioxide abrasive ceramically bonded together to form a homogeneous material sufficiently porous to provide a good bond with portland cement paste; or factory-graded emery aggregate consisting of not less than 45 percent aluminum oxide and 25 percent ferric oxide. The aggregate shall be well graded from particles retained on the No. 30 sieve to particles passing the No. 8 sieve.

2.10 LATEX BONDING AGENT

A. Latex agents for bonding fresh to hardened concrete shall conform to ASTM C1059/C1059M.

2.11 EPOXY RESIN

A. Epoxy resins for use in repairs shall conform to ASTM C881/C881M, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures. Submit manufacturer's product data, indicating VOC content. Manufacturer's catalog data for the items above, including printed instructions.

2.12 EMBEDDED ITEMS

A. Embedded items shall be of the size and type indicated or as needed for the application. Dovetail slots shall be galvanized steel. Inserts for shelf angles and bolt hangers shall be of malleable iron or cast or wrought steel.

2.13 JOINT MATERIALS

A. Joint Fillers, Sealers, and Waterstops

1. Materials for expansion joint fillers and waterstops shall be in accordance with Section 03 15 00.00 10 CONCRETE ACCESSORIES. Materials for and sealing of joints shall conform to the requirements of Section 07 92 00 JOINT SEALANTS.

B. Contraction Joints in Slabs

1. Materials for contraction joint inserts shall be in accordance with Section 03 15 00.00 10 CONCRETE ACCESSORIES.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

A. Before commencing concrete placement, perform the following: Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03 20 00.00 10 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.2 FOUNDATIONS

A. Concrete on Earth Foundations

1. Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

B. Preparation of Rock

1. Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Engineer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Keep rock surfaces continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Place concrete before the mortar stiffens.

3.3 PREVIOUSLY PLACED CONCRETE

A. Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface

with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Prepare concrete at the side of vertical construction joints as approved by the Engineer. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. Keep the surface of horizontal construction joints continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift. For heavy duty floors and two-course floors, a thin coat of neat cement grout of about the consistency of thick cream shall be thoroughly scrubbed into the existing surface immediately ahead of the topping placing. The grout shall be a 1:1 mixture of portland cement and sand passing the No. 8 sieve. The topping concrete shall be deposited before the grout coat has had time to stiffen.

1. Air-Water Cutting

    a. Air-water cutting of a fresh concrete surface shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 100 psi, plus or minus 10 psi, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Engineer, a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift in order to prolong the period of time during which air-water cutting is effective. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, high-pressure waterjet or sandblasting shall be used as the last operation before placing the next lift.

2. High-Pressure Water Jet

    a. Use a stream of water under a pressure of not less than 3,000 psi for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3. Wet Sandblasting

    a. Use wet sandblasting after the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. After wet

sandblasting, the surface of the concrete shall then be washed thoroughly to remove all loose materials.

4. Waste Disposal

a. The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

5. Preparation of Previously Placed Concrete

a. Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Remove laitance and loose particles. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.4 EMBEDDED ITEMS

A. Before placement of concrete, determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 12 inches of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.5 CONCRETE PRODUCTION

A. General Requirements

1. Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94/C94M, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

B. Batching Plant

1. Locate the batching plant onsite in the general area indicated on the drawings or offsite close to the project. The batching, mixing and placing

system shall have the capacity to accommodate the largest placement within a reasonable time. The batching plant shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

C. Batching Equipment

1. The batching controls shall be semiautomatic or automatic, as defined in NRMCA CPMB 100. Provide a semiautomatic batching system with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. Equip the batching system with accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. Record the weight of water and admixtures if batched by weight. Provide separate bins or compartments for each size group of aggregate and type of cementitious material, to prevent intermingling at any time. Aggregates shall be weighed either in separate weigh batchers with individual scales or, provided the smallest size is batched first, cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cementitious material. If both portland cement and other cementitious material are used, they may be batched cumulatively, provided that the portland cement is batched first. Water may be measured by weight or volume. Water shall not be weighed or measured cumulatively with another ingredient. Filling and discharging valves for the water metering or batching system shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. Piping for water and for admixtures shall be free from leaks and shall be properly valved to prevent backflow or siphoning. Furnish admixtures as a liquid of suitable concentration for easy control of dispensing. Provide an adjustable, accurate, mechanical device for measuring and dispensing each admixture. Each admixture dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and individually discharged automatically in a manner to obtain uniform distribution throughout the water as it is added to the batch in the specified mixing period. When use of truck mixers makes this requirement impractical, the admixture dispensers shall be interlocked with the sand batchers. Different admixtures shall not be combined prior to introduction in water and shall not be allowed to intermingle until in contact with the cement. Admixture dispensers shall have suitable devices to detect and indicate flow during dispensing or have a means for visual observation. Arrange the plant so as to facilitate the inspection of all operations at all times. Provide suitable facilities for obtaining representative samples of aggregates from each bin or compartment, and for sampling and calibrating the dispensing of cementitious material, water, and admixtures. Filling ports

for cementitious materials bins or silos shall be clearly marked with a permanent sign stating the contents.

D. Scales

1. The weighing equipment shall conform to the applicable requirements of CPMB Concrete Plant Standard, and of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. Provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. Perform the tests at the specified frequency in the presence of the Owner's inspector. Arrange the weighing equipment so that the plant operator can conveniently observe all dials or indicators.

E. Batching Tolerances

1. Tolerances with Weighing Equipment

MATERIAL	PERCENT OF REQUIRED WEIGHT
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

2. Tolerances with Volumetric Equipment - For volumetric batching equipment used for water and admixtures, the following tolerances shall apply to the required volume of material being batched:

MATERIAL	PERCENT OF REQUIRED MATERIAL
Water	plus or minus 1
Chemical admixture	0 to plus 6

F. Moisture Control

1. Provide a plant capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched.

G. Concrete Mixers

1. Mixers shall be stationary mixers capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. Operate the mixers at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

H. Stationary Mixers

1. Concrete plant mixers shall be drum-type mixers of tilting, nontilting, horizontal-shaft, or vertical-shaft type, or pug mill type provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C94/C94M applicable to central-mixed concrete.

I. Truck Mixers

1. Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C94/C94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Or, if approved in lieu of this, the number of revolutions shall be marked on the batch tickets. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.6 TRANSPORTING CONCRETE TO PROJECT SITE

A. Transport concrete to the placing site in truck mixers, or by approved pumping equipment or conveyors. Nonagitating equipment, other than pumps, shall not be used for transporting lightweight aggregate concrete.

3.7 CONVEYING CONCRETE ONSITE

A. Convey concrete from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

1. Buckets

a. The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

2. Transfer Hoppers

a. Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. Equip the transfer hopper with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3. Trucks

a. Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C94/C94M. Use nonagitating equipment only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

4. Chutes

a. When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. Use a discharge deflector when required by the Engineer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

5. Belt Conveyors

a. Design and operate belt conveyors to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and provided with positive means, such as

discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Construct belt conveyors such that the idler spacing does not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

6. Concrete Pumps

a. Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.8 PLACING CONCRETE

A. Discharge mixed concrete within 1.5 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, reduce the time to 45 minutes. Place concrete within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Provide adequate scaffolding, ramps and walkways so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities prevent proper consolidation, finishing and curing. Provide sufficient placing capacity so that concrete can be kept free of cold joints.

1. Depositing Concrete

a. Deposit concrete as close as possible to its final position in the forms, and with no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single lift. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of

weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for adjoining slabs.

2. Consolidation

   a. Immediately after placing, consolidate each layer of concrete by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; keep a spare vibrator at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Insert vibrators vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Do not use grate tampers (jitterbugs).

3. Cold Weather Requirements

   a. Use special protection measures, approved by the Engineer, if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F.

Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C494/C494M, Type C or E may be used, provided it contains no calcium chloride. Do not use calcium chloride.

4. Hot Weather Requirements

   a. When job-site conditions are present or anticipated that accelerate the rate of moisture loss or rate of cement hydration of freshly mixed concrete, including an ambient temperature of 80 degrees F or higher, and an evaporation rate that exceeds 0.2 lb/ft2/h, concrete work shall conform to all requirements of ACI 305.1.

5. Prevention of Plastic Shrinkage Cracking

   a. During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Take particular care if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Conform with the requirement of ACI 305.1. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

6. Placing Concrete Underwater

   a. Deposit concrete in water by a tremie or concrete pump. The methods and equipment used shall be subject to approval. Concrete buckets shall not be used for underwater placement of concrete except to deliver concrete to the tremie. The tremie shall be watertight and sufficiently large to permit a free flow of concrete. The concrete shall be deposited so that it enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete. Keep the discharge end of the pump line or tremie shaft continuously submerged in the concrete. The underwater seal at start of placing shall not produce undue turbulence in the water. Keep the tremie shaft full of concrete to a point well above the water surface. Placement shall proceed without interruption

until the concrete has been brought to the required height. The tremie shall not be moved horizontally during a placing operation, and a sufficient number of tremies shall be provided so that the maximum horizontal flow of concrete will be limited to 15 feet. Concrete shall not be deposited in running water or in water with a temperature below 35 degrees F.

7. Placing Concrete in Congested Areas

   a. Use special care to ensure complete filling of the forms, elimination of all voids, and complete consolidation of the concrete when placing concrete in areas congested with reinforcing bars, embedded items, waterstops and other tight spacing. An appropriate concrete mixture shall be used, and the nominal maximum size of aggregate (NMSA) shall meet the specified criteria when evaluated for the congested area. Vibrators with heads of a size appropriate for the clearances available shall be used, and the consolidation operation shall be closely supervised to ensure complete and thorough consolidation at all points. Where necessary, splices of reinforcing bars shall be alternated to reduce congestion. Where two mats of closely spaced reinforcing are required, the bars in each mat shall be placed in matching alignment to reduce congestion. Reinforcing bars may be temporarily crowded to one side during concrete placement provided they are returned to exact required location before concrete placement and consolidation are completed.

8. Placing Flowable Concrete

   a. If a plasticizing admixture conforming to ASTM C1017/C1017M is used or if a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph SYSTEM DESCRIPTION. Use extreme care in conveying and placing the concrete to avoid segregation. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.9 JOINTS

A. Locate and construct joints as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. In general, locate such joints near the middle of the spans of supported slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs, unless otherwise approved. Joints shall be perpendicular to the main reinforcement. All

reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 30 pound asphalt-saturated felt, extending for the full depth of the slab. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 07 92 00 JOINT SEALANTS.

1. Construction Joints

    a. Locate construction joints as shown on the Drawings. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Engineer. Unless otherwise indicated and except for slabs on grade, extend reinforcing steel through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete begins to lose its plasticity, before placing concrete for beams, girders, or slabs thereon. In walls having door or window openings, terminate lifts at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls or columns are required, a strip of 1 inch square-edge lumber, beveled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Place concrete to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete above.

2. Contraction Joints in Slabs on Grade

    a. Contraction joints shall be located and detailed as shown on the drawings. Produce contraction joints by forming a weakened plane in

the concrete slab using materials and procedures specified in Section 03 15 00.00 10 CONCRETE ACCESSORIES.

3. Expansion Joints

a. Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03 15 00.00 10 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS and Section 07 92 00 JOINT SEALANTS.

4. Waterstops

a. Install waterstops in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03 15 00.00 10 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

5. Dowels and Tie Bars

a. Install dowels and tie bars at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03 20 00.00 10 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.10 EXTERIOR SLAB AND RELATED ITEMS

A. Pavements

1. Construct pavements where shown on the drawings. After forms are set and underlying material prepared as specified, place the concrete uniformly throughout the area and thoroughly vibrated. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Take care to prevent bringing excess paste to the surface. Curing shall be as specified.

B. Sidewalks

1. Concrete shall be 4 inches minimum thickness. Provide contraction joints at 5 feet spaces unless otherwise indicated. Contraction joints shall be cut 1 inch deep with a jointing tool after the surface has been finished. Provide transverse expansion joints 1/2 inch thick at changes in direction and where sidewalk abuts curbs, steps, rigid pavement, or other similar structures. A transverse slope of 1/4 inch per foot shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1/4 inch in 5 feet.

C. Curbs and Gutters

1. Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (1/2 inch wide) shall be provided at 100 feet maximum spacing unless otherwise indicated.

D. Pits and Trenches

1. Construct pits and trenches as indicated on the drawings. Bottoms and walls shall be placed monolithically or waterstops and keys, shall be provided as approved.

3.11 TESTING AND INSPECTION FOR CQC

A. Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required. Submit certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

1. When, in the opinion of the Engineer, the concreting operation is out of control, cease concrete placement and correct the operation.

2. The laboratory performing the tests shall be onsite and shall conform with ASTM C1077. Materials may be subjected to check testing by the Owner from samples obtained at the manufacturer, at transfer points, or at the project site.

3. The Owner will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per quarter thereafter for conformance with ASTM C1077.

B. Grading and Corrective Action

1. Fine Aggregate

a. At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C136 and COE CRD-C 104 for the fine

aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Engineer, concreting shall be stopped, and immediate steps taken to correct the grading.

2. Coarse Aggregate

a. At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Engineer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Engineer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

C. Quality of Aggregates

1. Thirty days prior to the start of concrete placement, perform all tests for aggregate quality required by ASTM C33/C33M. In addition, after the start of concrete placement, perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

D. Scales, Batching and Recording

1. Check the accuracy of the scales by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be

made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

E. Batch-Plant Control

1. Continuously control the measurement of concrete materials, including cementitious materials, each size of aggregate, water, and admixtures. Adjust the aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. Prepare a report indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

F. Concrete Mixture

1. Air Content Testing. Perform air content tests when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Perform additional tests when excessive variation in workability is reported by the placing foreman or Owner's inspector. Tests shall be made in accordance with ASTM C231/C231M for normal weight concrete and ASTM C173/C173M for lightweight concrete. Plot test results on control charts which shall at all times be readily available to the Owner and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, perform a second test immediately. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment in PART 1. Set an upper

warning limit and a lower warning limit line 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Engineer, and the air content at the mixer controlled as directed.

2. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

3. Slump Testing. In addition to slump tests which are made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C143/C143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Owner's inspector. Plot test results on control charts which shall at all times be readily available to the Owner and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, immediately perform a second test. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Set limits on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line

and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Take samples for slump at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, take correlation samples at the placement site as required by the Engineer, and the slump at the mixer controlled as directed.

4. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, make an adjustment immediately in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, halt the concreting operation immediately, and take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

5. Temperature. Measure the temperature of the concrete when compressive strength specimens are fabricated in accordance with ASTM C1064/C1064M. Report the temperature along with the compressive strength data.

6. Strength Specimens. Perform at least one set of test specimens, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Perform additional sets of test specimens, as directed by the Engineer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) sampling plan for approval by the Engineer prior to the start of construction. The plan shall ensure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. A set of test specimens for concrete with a 90-day strength in accordance with the same paragraph shall consist of six specimens, two tested at 7 days, two at 28 days, and two at 90 days. Test

specimens shall be molded and cured in accordance with ASTM C31/C31M and tested in accordance with ASTM C39/C39M for test cylinders and ASTM C78/C78M for test beams. Results of all strength tests shall be reported immediately to the Engineer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214R.

G. Inspection Before Placing

1. Inspect foundations, construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify to the Engineer that they are ready to receive concrete. Report the results of each inspection in writing.

H. Placing

1. The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Engineer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

I. Vibrators

1. Determine the frequency and amplitude of each vibrator in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Perform additional tests as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. Determine the amplitude with the head vibrating in air. Take two measurements, one near the tip and another near the upper end of the vibrator head, and these results averaged. Report the make, model, type, and size of the vibrator and frequency and amplitude results in writing. Any vibrator not meeting the requirements of paragraph Consolidation above, shall be immediately removed from service and repaired or replaced.

J. Cold-Weather Protection

1. At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

K. Mixer Uniformity

1. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C94/C94M.

2. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C94/C94M. Select the truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

3. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

L. Reports

1. Report all results of tests or inspections conducted, informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Engineer has the right to examine all contractor quality control records.

END OF SECTION 03 30 00.00 10

SECTION 03 39 00.00 10
CONCRETE CURING 11/10

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182 (2005; R 2009) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM C309 (2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 400 (1963) Requirements for Water for Use in Mixing or Curing Concrete

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Test Reports

a. Testing and Inspection for CQC

1.3 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be stored in such a manner as to avoid contamination and deterioration. Materials shall be capable of being accurately identified after bundles or containers are opened.

PART 2 PRODUCTS

2.1 CURING MATERIALS

A. Membrane-Forming Compound

1. Membrane-Forming curing compound shall conform to ASTM C309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing

compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall contain a fugitive dye, and shall have the reflective requirements in ASTM C309 waived.

B. Burlap and Cotton Mat

1. Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.2 WATER

A. Water for curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

PART 3 EXECUTION

3.1 FINISHING UNFORMED SURFACES

3.2 CURING AND PROTECTION

A. General

1. Concrete shall be cured by an approved method for the period of time given below:

Type III portland cement	3 days
Portland cement when accelerator is used to achieve high early strength, except when fly-ash or GGBF slag is used	3 days
Type I portland cement	7 days
Portland cement blended with silica fume	7 days
Type II portland cement	14 days
Portland cement blended with 25 percent of less fly-ash or GGBF slag	14 days
Portland cement blended with more than 25 percent fly-ash or GGBF slag	21 days

a. Immediately after placement, protect concrete from premature drying, extremes in temperatures, rapid temperature change and mechanical injury for the duration of the curing period. Concrete shall be protected from the damaging effects of rain for 12 hours and from flowing water for 14 days . No fire or excessive heat including welding shall be permitted near or in direct contact with concrete or

concrete embedments at any time. Maintain air and forms in contact with concrete at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds in PART 2, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

B. Moist Curing

1. Maintain concrete, to be moist-cured, continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be carefully broken loose from the concrete, soon after the concrete hardens, and curing water continuously applied into the void so as to continuously saturate the entire concrete surface. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Horizontal surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. Provide an approved work system to ensure that moist curing is continuous 24 hours per day. Horizontal construction joints may be allowed to dry for 12 hours immediately prior to the placing of the following lift. Silica fume concrete, if used, shall be moist-cured. Curing of silica fume concrete shall start immediately after placement.

C. Membrane Forming Curing Compounds

1. Application Restrictions

a. Concrete may be cured with an approved membrane-forming curing compound in lieu of moist curing except that membrane curing will not be permitted on any surface to which a grout-cleaned finish is to be applied or other concrete is to be bonded, on any surface containing protruding steel reinforcement, on an abrasive aggregate finish. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C309, Class B requirements, may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam.

2. Pigmented Curing Compound

a. A pigmented curing compound meeting the requirements of the above paragraph may be used on surfaces that will not be exposed to view when the project is completed.

3. Nonpigmented Curing Compound

a. A nonpigmented curing compound containing a fugitive dye may be used on surfaces that will be exposed to view when the project is completed. Concrete cured with nonpigmented curing compound must be shaded from the sun for the first 3 days when the ambient temperature is 90 degrees F or higher.

4. Application

a. Apply the curing compound to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water, and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared and bleeding has stopped. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet per gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces that have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian

and vehicular traffic and from any other cause that will disrupt the continuity of the curing membrane.

D. Ponding or Immersion

1. Concrete shall be continually immersed throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete.

E. Cold Weather Curing and Protection

1. When the daily ambient low temperature is less than 32 degrees F maintain the temperature of the concrete above 40 degrees F for the first seven days after placing. During the period of protection removal, control the air temperature adjacent to the concrete surfaces so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. Perform the installation of the thermometers as directed.

3.3 TESTING AND INSPECTION FOR CQC

A. Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required. Submit certified copies of laboratory test reports, including curing compound proposed for use on this project.

1. Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, compute the rate of coverage in square feet/gallon, and note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

END OF SECTION 03 39 00.00 10

SECTION 07 92 00
JOINT SEALANTS 01/07

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1311	(2010) Standard Specification for Solvent Release Agents
ASTM C509	(2006; R 2011) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C920	(2011) Standard Specification for Elastomeric Joint Sealants
ASTM D1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D2452	(2003; R 2009) Standard Test Method for Extrudability of Oil- and Resin-Base Caulking Compounds
ASTM D2453	(2003; R 2009) Standard Test Method for Shrinkage and Tenacity of Oil- and Resin-Base Caulking Compounds

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. Product Data
    a. Sealants
    b. Primers
    c. Bond breakers
    d. Backstops
    e. Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). Provide a copy of the Material Safety Data Sheet for each solvent, primer or sealant material.
2. Certificates
    a. Sealant

b. Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS

A. Apply sealant when the ambient temperature is between 40 and 90 degrees F.

1.4 DELIVERY AND STORAGE

A. Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

1.5 QUALITY ASSURANCE

A. Compatibility with Substrate

1. Verify that each of the sealants are compatible for use with joint substrates.

B. Joint Tolerance

1. Provide joint tolerances in accordance with manufacturer's printed instructions.

C. Mock-Up

1. Project personnel are responsible for installing sealants in mock-up, using materials and techniques approved for use on the project.

1.6 SPECIAL WARRANTY

A. Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

PART 2 PRODUCTS

2.1 SEALANTS

A. Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

B. For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.

2.2 PRIMERS

A. Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3 BOND BREAKERS

A. Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.4 BACKSTOPS

A. Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum or other types of absorptive materials as backstops.

1. Rubber

a. Conform to ASTM D1056, Type 2, closed cell, Class B, Grade as recommended by manufacturer, round cross section for cellular rubber sponge backing.

2. Synthetic Rubber

a. Conform to ASTM C509, Option I, Type I preformed rods for Synthetic rubber backing.

3. Neoprene

a. Conform to ASTM D1056, closed cell expanded neoprene cord Type 2, Class C, Grade as recommended by manufacturer for Neoprene backing.

4. Butyl Rubber Based

a. Provide Butyl Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C1311.

5. Silicon Rubber Base

a. Provide Silicon Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C920, Non-sag, Type S, Grade P or NS for horizontal surfaces and Grade NS for vertical surfaces, Class 50.

2.5 CAULKING

A. Conform to ASTM D2452 and ASTM D2453, Type I or II, for Oil- and resin-based caulking.

2.6 CLEANING SOLVENTS

A. Provide type(s) recommended by the sealant manufacturer.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

1. Steel Surfaces

a. Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

2. Concrete and Masonry Surfaces

a. Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity.

3. Wood Surfaces

a. Keep wood surfaces to be in contact with sealants free of splinters and sawdust or other loose particles.

3.2 SEALANT PREPARATION

A. Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

A. Joint Width-To-Depth Ratios

1. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, masonry, or stone:		
1/4 inch (minimum)	1/4 inch	1/4 inch

over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
over 1/2 inch to 2 inch	1/2 inch	5/8 inch
Over 2 inch	As recommended by sealant manufacturer	

2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding is not required on metal surfaces.

B. Masking Tape

1. Place masking tape on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Remove masking tape within 10 minutes after joint has been filled and tooled.

C. Backstops

1. Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

   a. Where indicated.

   b. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".

D. Primer

1. Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

E. Bond Breaker

1. Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

F. Sealants

1. Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

A. Protection

1. Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

B. Final Cleaning

1. Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

END OF SECTION 07 92 00

SECTION 09 97 13.26
COATING OF STEEL WATERFRONT STRUCTURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

A. ASTM International (ASTM)

1. ASTM D 7091 (2005) Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nondestructive Coatings Applied to Non-Ferrous Metals

2. ASTM E 376 (2006) Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

B. The Society for Protective Coatings (SSPC)

1. SSPC PS 13.01 (1982; E 2004) Epoxy Polyamide Painting System

2. SSPC Paint 22 (1982; E 2004) Paint Specification No. 22 Epoxy-Polyamide Paints (Primer, Intermediate, and Topcoat)

3. SSPC SP 1 (1982; E 2004) Solvent Cleaning

4. SSPC SP 10 (2007) Near-White Blast Cleaning

C. ASTM International (ASTM)

1. ASTM D 7091 (2005) Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

1.2 SUBMTITALS

A. Certificates

1. Epoxy-polyamide

1.3 ENVIRONMENTAL CONDITIONS

A. Start work only when ambient and curing temperatures are within limits of coating manufacturer's recommendat4ions and at least 5 degrees F above dew point temperature.

1.4 SAFETY AND HEALTH PRECAUTIONS

A. Follow safety procedures as recommended by manufacturer. Work in a well-ventilated area. Provide, and require workers to use, impervious clothing, gloves, face shields (8 inch minimum), and other appropriate protective clothing

necessary to prevent eye and skin contact with coating materials. Keep coatings away from heat, sparks and flame.

PART 2 PRODUCTS

2.1 COATING SYSTEMS

A. Coating

1. Provide catalyst components for coatings specific for resin components. Use thinners which are compatible with the coating.

B. Epoxy-Polyamide

1. System: SSPC PS 13.01

2. Paints: SSPC Paint 22, Primer, Intermediate and Top Coats

PART 3 EXECUTION

3.1 CLEANING AND PREPARATION OF SURFACES

A. Solvent Cleaning

1. SSPC SP 1. Remove visible oil, grease, and drawing and cutting compounds by solvent cleaning

B. Blast Cleaning

1. SSPC SP 10. After solvent cleaning, complete surface preparation by near-white blast cleaning. Remove residual dust from blasted surface by blowing with dry, oil-free air, vacuuming, or sweeping. Provide surface profile of at least 1 1/2 mil thickness.

3.2 PROPORTIONING AND MIXING OF COATING SYSTEM

A. Proportioning of Epoxy-Polyamide System

1. Epoxy-polyamide coatings consist of a two-component system that includes a pigmented polyamide resin, Component A and an epoxy resin, Component B. Mix both components in a ratio of 1 to 1 by volume. Do not thin coatings when doing so will result in total volatile organic compounds exceeding limits enacted by local air pollution control district. When thinning is allowed and is necessary, such as during cold temperature application or to improve application characteristics, add up to one pint of ethylene glycol monoethyl (EGM) ether for each gallon of the coating.

B. Mixing of Epoxy-Polyamide System

1. Mix components of coating by power stirring until a smooth, uniform consistency results. Stir coating periodically during its induction period. Follow Table 1 for induction time and pot life of mixed batches.

TABLE 1

JOB SITE AMBIENT TEMPERATURE AND INDUCTION TIME FOR EPOXY-POLYAMIDE SYSTEM

Ambient Temperature Degrees F	Induction Time (in hours)
40 to 50	2 at 70 degrees F
50 to 60	2
60 to 70	1 to 1-1/2
70 and above	1/2 to 1

3.3 COATING APPLICATION

A. General

1. Apply primer coating to dry surfaces not more than 4 hours after near-white blast cleaning. Apply coats of each system so that finished surfaces are free from runs, sags, brush marks and variations in color.

2. Application Method for Epoxy-Polyamide System

a. Allow previous coat to dry to tack-free condition but not more than 72 hours before applying next coat. If more than 72 hours elapses between coats, clean surface, apply a 2 mil wet film thickness of previous coat, allow to cure to a tacky film, and apply a full thickness of next coat.

B. Repairs of Defects

1. Repair detected coating holidays, thin areas, and exposed areas damaged prior to or during installation by surface treatment and application of additional coating or by manufacturer's recommendations. Allow a period of at least 72 hours to pass following final coat before placing in immersion service.

C. Three-Coat Epoxy-Polyamide System

1. Apply each coat at a dry film thickness of between 3 mils and 4 mils.

D. Dry Film Thickness

1. Provide total system minimum dry film thickness of 9 mils. Measure using a magnetic gage.

3.4 SURFACES TO BE COATED

A. Steel Waterfront Construction

1. Unless otherwise stated, coat steel work.

3.5 FIELD TESTS

Conduct testing in presence of National Grid / National Grid's Engineer. Contracting Officer.

A. Holiday Testing

1. Prior to installation, test for holidays in total coating system. Use a low-voltage holiday detector of less than 90 volts in accordance with manufacturer's instructions. After repair of holidays by surface treatment and application of additional coating or by manufacturer's recommendation, retest with a low-voltage holiday detector.

B. Dry Film Thickness

1. After repair of holidays, measure dry film thickness using a magnetic dry film thickness gage in accordance with ASTM D 7091 and ASTM E 376. Re-measure after an additional coat is applied, and add it to meet minimum thickness requirements.

END OF SECTION 09 97 13.26

SECTION 31 09 00
GEOTECHNICAL INSTRUMENTATION

PART 1 GENERAL

1.1 SUMMARY

A. This specification describes all labor, equipment, supplies, and materials required to monitor settlement, displacement, and vibrations during the Work. Description of instrumentation installed by others under a previous contract and installed by the Construction Manager (CM)/Engineer are also included for reference. This specification also describes the protection of equipment and procedures to be followed in case the instrumentation is damaged.

PART 2 MATERIALS

2.1 INCLINOMETERS

A. General: Provided by CM/Engineer. Instruments specified in this section will be supplied by Slope Indicator Company, 3668 Albion Place North, Seattle, Washington 98103, or Earl B. Hall, Inc., 1050 Northgate Drive, Suite 400, San Rafael, California 94903, or equal. Model numbers in this section refer to those by Slope Indicator Company.

B. Casing Grout Mix. The grout mix for grouting the casing within a bore hole will be neat cement grout with a minimum unconfined compressive strength at 28 days of 4,000 psi.

C. Inclinometer Casing. Casing for inclinometer installations will be 2.75 inch (69.85 mm) outside diameter ABS plastic with snap together couplings. The inside of the casing shall contain a biaxial pattern of four longitudinal grooves to match the inclinometer probe guide wheels.

D. Inclinometer Casing Caps. The end of the casing will be sealed or protected with weather tight caps.

E. Roadway Box. 4 inch diameter with flush-mounted, bolted lid.

2.2 SURVEY MONITORING POINTS

A. General: Stakes, nails, marks, string lines, or other devices or mechanisms set or established for the purpose of indicating or controlling the three dimensional location of any feature.

2.3 VIBRATION MONITORING

A. General: Provided by CM/Engineer. Instruments supplied will be Instantel seismographs or equal.

2.4 CRACK MONITORING

A. General: Crack displacement monitoring gauges will be provided by CM/Engineer.

PART 3 EXECUTION

3.1 INSTALLATION

A. The CM/Engineer will be responsible for the installation of the Inclinometers and crack displacement monitoring gauges. The survey monitoring points (SMP) on the existing structures have been installed by others under a previous contract. The Contractor shall be responsible for installing SMPs on the new secant pile wall and replacing instruments that are damaged during the execution of this contract.

B. Coordinate schedules with the CM/Engineer to allow for the instrumentation to be installed in a timely fashion.

3.2 PROTECTION

A. Protect all instruments from damage due to construction operations, weather, traffic, and vandalism.

B. The Contractor is liable for all costs associated with the replacement of geotechnical instruments that are damaged as a direct result of their actions or the actions of their Subcontractors.

C. Conduct no Work without authorization of the CM/Engineer within 50 feet of damaged instrumentation until the instrument is repaired or replaced, as needed.

3.3 SETTLEMENT AND STABILITY MONITORING

A. Obtain the services of a Professional Surveyor licensed in the State of New York to record the movement on Survey Monitoring Points (e.g., reflective survey targets) that have been installed by the CM/Engineer.

B. Establish surveyor control points that are located at least 250 feet beyond the limits of the ***work***.

C. Monitor both horizontal and vertical movement of the SMPs.

D. Tolerances:

1. Measure the initial location of each monitoring point with respect to a benchmark(s). A minimum of two sets of baseline readings must be collected and all baseline readings shall be collected no later than 3 days prior to construction.

2. Measure the location of monitoring points to an accuracy of plus/minus 0.01 feet in the horizontal and vertical direction.

3. Two lines of monitoring points have been located every 20 feet along the existing sheet pile wall by others. The first line is located along the upper

most waler supporting the existing sheet pile wall. The second line has been established on the sheet pile wall at an approximate elevation of +2 feet NAVD 88. Both lines of monitoring points extend onto the existing concrete land wall south of the Lock and stop at the southern gate as shown on the drawings. Additional monitoring may be added if considered necessary throughout the course of the project.

4. One line of monitoring points shall be established along the new secant pile wall after it is constructed. The monitoring points should be located at elevation +14 feet NAVD88 (6 inches below the top of secant pile wall cut off elevation). The monitoring points should be located in the closest primary pile located every 20 feet. Locate the monitoring points along the secant pile wall immediately after the installation of the secant pile wall as shown in the Contract Drawings.

5. The maximum allowable cumulative vertical or horizontal movement measured at any SMP on the steel bulkhead is:

   a. Alarm Level 1.5 inches. Stop work and inform the CM/Engineer. Do not resume construction activities until told to do so by the CM/Engineer.

   b. Action Level 2.5 inches. Stop all related construction activities to prevent additional movement if the movement criterion is exceeded. These criteria may be adjusted by the CM/Engineer based on actual conditions experienced on Site.

6. The maximum allowable cumulative vertical or horizontal movement measured at any SMP on the concrete south land wall is:

   a. Alarm Level 0.5 inches. Stop work and inform the CM/ Engineer. Do not resume construction activities until told to do so by the CM/Engineer.

   b. Action Level 1.0 inches. Stop all related construction activities to prevent additional movement if the movement criterion is exceeded. These criteria may be adjusted by the CM/Engineer based on actual conditions experienced on Site.

3.4 VIBRATION LIMITS

A. Conduct all Work in such a manner that vibrations caused by the Work do not damage nearby structures.

B. Do not allow vibration levels at nearby Lock structures to exceed the guidance criteria set forth by USBM RI 8057, excerpted in the table below.

Frequency, Hz	Maximum Safe Particle Velocity value, in/s
1, 2, 3, 4	0.18, 0.36, 0.54, 0.75
4 – 14	0.75
14, 20, 30, 40	0.75, 1.0, 1.4, 2.0
40 - 100	2.0

C. The guidance provided in the USBM maximum safe particle velocity values table does not relieve the Contractor from responsibility with regard to fulfillment of the terms of the Contract and the requirement to protect the existing structures and restore or replace damage caused either directly or indirectly during the performance of the Work.

D. The CM/Engineer may instruct the Contractor to implement vibration reduction strategies in order to mitigate vibration levels which exceed the USBM criteria during the performance of the Work.

E. Requests for an increase in time or relevant pay items related to the implementation of any vibration reduction strategies needed to meet the requirements of this Section will be denied.

3.5 CRACK DISPLACEMENT MONITORING GAUGES

A. Installation

1. The CM/Engineer will install crack displacement monitoring gauges at locations on Lock structures selected by the CM/Engineer or the USACE Engineer. The locations will accessible for monitoring from the land and Lock walkways.

2. The CM/Engineer will obtain initial baseline readings after installation of the gauges. Readings shall be performed daily prior to, and during, vibration producing activities.

B. Tolerances

1. The maximum allowable movement perpendicular to the crack measured at any crack displacement monitoring gauges on the Lock is:

a. Alarm Level 1/8 inch. Stop work and inform the CM/Engineer. Do not resume construction activities until told to do so by the CM/Engineer.

b. Action Level 1/4 inch. Stop all related construction activities to prevent additional movement if the movement criterion is exceeded. These criteria may be adjusted by the CM/Engineer based on actual conditions experienced on Site.

3.6 INCLINOMETERS

A. Installation

1. Three inclinometers will be installed by the CM/Engineer at the locations indicated in Contract Drawings after connecting the primary secant piles to the permanent tie rods. The inclinometer casing should be extended to 10 feet below the bottom of the secant pile wall and should stick up to elevation +19. To avoid coring of the secant piles for inclinometer installation, 6 inch diameter steel inclinometer sleeve piping will be tack welded to the steel core beams prior to the secant piles installation. The inclinometer installation will include: a) drilling through the drillable bottom pipe cap and extending the borehole 10 feet below the secant pile wall, b) lowering the inclinometer casing to the bottom of the borehole and c) grouting the annulus between the borehole and inclinometer casing with neat cement grout.
2. The inclinometer internal grooves should be aligned in the directions parallel and perpendicular to the secant pile wall alignment.
3. Contractor shall make allowances in the schedule for the installation of the inclinometers.
4. Contractor shall cast a roadway box in the cap beam at inclinometer casing locations and shall cut inclinometer casing to fit below roadway box.
5. The as-built locations and ground surface and top of inclinometer casing elevations shall be measured by the professional surveyor retained by the Contractor for the SMP monitoring work outlined in Section 3.3 above.

B. Tolerances:

1. A minimum of three sets of baseline measurements shall be taken. One to be taken at least 2 days after the installation of the inclinometer and setting of the grout, and the remaining two, to be taken at least 4 days.
2. The casing grooves shall be surveyed with an inclinometer probe at 2-foot intervals for the entire length following the procedures recommended by the manufacturer. In addition, an SMP should be established at the top of the inclinometer casing, and optically surveyed every time the inclinometers are read.
3. The maximum allowable cumulative movement in the direction perpendicular to the wall alignment is:
    a. Alarm Level 1.5 inch. Stop work and inform the CM/Engineer. Do not resume construction activities until told to do so by the CM/Engineer.

b. Action Level 2.5 inch. Stop all related construction activities to prevent additional movement if the movement criterion is exceeded. These criteria may be adjusted by the CM/Engineer based on actual conditions experienced on-Site.

3.7 DATA ACQUISITION

A. Daily monitoring will be required for all SMPs during each active work day. Inclinometers will be monitored two times a week until the secant pile wall is completed and tied to the anchored piles, and on a weekly basis thereafter. Submit updated elevations and coordinates of the monitoring points to the CM/Engineer immediately after the points have been surveyed. The frequency of the reading may be adjusted by CM/Engineer based on the actual conditions experienced on Site.

B. Provide safe access to each inclinometer location to allow for data collection by the CM/Engineer.

C. Data obtained by the CM/Engineer will be made available, upon request, to the Contractor. The Contractor may observe the CM/Engineer during data acquisition.

END OF SECTION 31 09 00

SECTION 31 10 00
SITE PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the Site preparation prior to performance of the RA.

1.2 SUBMITTALS

A. Provide the DIGSAFE ticket number and the findings of the utility mark out to National Grid and the CM/Engineer prior to excavation.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTIONS

3.1 GENERAL SITE PREPARATION ACTIVITIES

A. Clear all debris, rubble, and vegetation from the Work areas and in any other areas which will be used for construction support as approved by the CM/Engineer.

B. Clear all debris, rubble, and vegetation from the air monitoring station locations as directed by the CM/Engineer.

C. Provide protection for existing monuments, structures, and appurtenances during the Work.

D. Provide protection and security for air monitoring station locations during the Work.

E. Provide temporary relocation of appurtenances that have the potential to become damaged during performance of the Work.

3.2 UTILITY PROTECTION

A. Contact the DIGSAFE Call Center to request that all utilities on the Site are located and marked. Ensure that the utility mark out is refreshed as necessary, as directed by DIGSAFE, or at the direction of National Grid or the CM/Engineer.

B. Retain the services of a private underground utility location company to mark out the locations of underground utilities in the areas of planned excavation on private property.

C. Any underground utility protection will be the responsibility of the Contractor prior to and during any excavation activities.

D. Hand dig when the depth of location of utilities is uncertain.

E. Repair any utilities damaged as a result of the Work.

3.3 TEMPORARY CONSTRUCTION ENTRANCE

A. Obtain the appropriate permits required for temporary construction entrances, if necessary; refer to Section 01 41 00 – Regulatory Requirements – Permits.

B. Install the temporary construction entrance in accordance with any City of Troy requirements.

3.4 MARINE SIGNALING EQUIPMENT

A. Install marine signaling equipment per the plans and specifications.

B. Maintain marine signaling equipment for the duration of the work.

3.5 TURBIDITY CURTAIN

A. Install and maintain the turbidity curtain per the plans and specifications

B. Maintain the turbidity curtain for the duration of the project

3.6 DEBRIS REMOVAL

A. Remove debris within the limits of Work area, and debris generated during the demolition of the asphaltic and concrete surfaces; handle, screen and characterize as necessary.

B. Remove all debris (i.e. trash, metal, concrete, asphalt, etc.) within the Site boundary. Conduct all handling, segregating and screening activities that are necessary to facilitate off-Site disposal.

C. Contaminated materials must be segregated from non-contaminated materials and prepared, as necessary, for disposal at the facilities approved for use during performance of the RA.

D. Dispose of all debris at an approved disposal or recycling facility.

END OF SECTION 31 10 00

SECTION 31 23 00
EXCAVATION, FILLING, AND SOIL CAPPING

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the excavation, handling, and backfilling of material during performance of the Remedial Action.

1.2 SUBMITTALS

A. Excavation and Backfilling Plan: Submit an Excavation and Backfilling Plan showing sequencing, staging, and phasing of the excavation, materials handling and backfilling activities. Incorporate into Site Operations Plan submittal described in Section 01 30 00 – Administrative Requirements.

B. Soil Capping Plan: Submit a Soil Capping Plan showing sequencing, staging, and phasing of the capping activities. Incorporate into Site Operations Plan submittal described in Section 01 30 00 – Administrative Requirements.

C. Borrow Source Evaluation: Submit the results of the borrow source evaluation for each source to be used as imported clean backfill indicating the material is in compliance with the geotechnical and environmental criteria. Perform borrow source evaluation prior to the import of fill from the borrow source. Submit the results of the borrow source evaluation to the CM/Engineer as detailed in Section 01 33 00 – Submittal Procedures. Include the following:

1. Name, address, telephone number, facsimile number, and web site address of borrow source.

2. Certificate of clean fill from the borrow location stating that the soil is native in origin and free of contamination.

3. Analytical results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is free of contamination and in compliance with the clean fill environmental criteria.

D. Perform borrow source evaluation for environmental criteria to ensure that the imported material meets the project criteria. Imported backfill must meet the requirements of 6NYCRR 375-6.7(d) and DER-10 5.4(e).3.

E. Geotechnical test results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is in compliance with the clean fill geotechnical criteria.

F. Product data:

1. Articulated Concrete Block Mats

2. Woven Geotextile

PART 2 PRODUCTS

2.1 GENERAL

A. Provide a stabilization agent, such as cement kiln dust (CKD), or equivalent to amend soils too wet to transport in trucks , as necessary. The stabilization agent used must be acceptable to the disposal facility and in accordance with NYSDEC requirements for amendments, provided in Information for Bidders. Quick lime or lime kiln dust (LKD) shall contain less than 50% available CaO and MgO to be acceptable for this purpose. Provide National Grid and the CM/Engineer the manufacturer MSDS and product information for all amendments prior to being imported to the Site.

B. Odor Suppressing Foam

1. Provide a Rusmar foam (or CM/Engineer-approved equivalent) unit of sufficient size (minimum of a Rusmar PFU400/25 unit) that is capable of covering the areas containing impacted soil within 5 minutes on the Project Site, for the duration of the Holder excavation.

2. Provide sufficient odor suppressing foam to cover stockpiles of impacted soil from the Holder excavation and impacted soils in truck beds. Foam shall be water based, white, and unscented.

2.2 BACKFILL

A. Bedding Stone Gravel Fill

1. Furnish Gravel Fill that consists of hard, angular, durable particles of fragments of stone. Materials that break up when alternately frozen and thawed or wetted and dried will not be used. Utilize Gravel Fill that meets the following gradation requirements, or equivalent as approved by the CM/Engineer.

U.S. Standard Sieve	Percent Finer by Dry Weight
1.0 inch	100
3/4 inch	90 to 100
0.5 inch	10 to 50
3/8 inch	0 to 20
No. 4	0 to 5

B. Topsoil

1. Furnish Topsoil that conforms to material designation Topsoil-Type A in section §713-01 of the New York State Department of Transportation

Standard Specification, which includes the following gradation requirements:

U.S. Standard Sieve	Percent Finer by Dry Weight
2 inch	100
1 inch	85 to 100
0.25 inch	65 to 100
No. 200	20 to 65
2 micron particle	0 to 20

2. Conduct an analysis for pH, organic content, and grain size via ASTM D6913-latest edition, for each sample of topsoil collected.

3. Collect at least one sample from each source proposed for use.

C. Subsoil Fill

1. Furnish Clean Fill that conforms to material designation 304-1 Type 4 in the May 1, 2008, Standard Specification prepared by the New York State Department of Transportation that has a pH greater than 5 and less than 10, free of organic matter, and meets the following requirements:

U.S. Standard Sieve	Percent Finer by Dry Weight
2 inch	100
0.25 inch	30 to 65
No. 40	5 to 40
No. 200	0 to 10

D. Impervious Fill (Low Permeability Material)

U.S. Standard Sieve	Percent Finer by Dry Weight
1 inch	100
No. 4	80
No. 200	50

Minimum Plasticity Index of 10, and Maximum Plasticity Index of 40 by ASTM D4318.

Maximum Hydraulic Conductivity of 1 x 10-7 centimeters per second by ASTM D5084.

E. Rip Rap and Stone Fill

Riprap and Stone Fill shall consist of durable field or quarry stone of approved quality; hard dense and angular, solid and free from structural defects such as seams, and cracks: conforming to the size requirements as outlined in New York State Department of Transportation Specification Section 620 – Bank and Channel Protection. Rip rap shall meet the requirements for dry rip rap and stone fill shall meet the requirements for light stone fill as described in Figure 620-1 of NYSDOT Section 620.

F. Reuse Material

Material designated by the Engineer for possible reuse shall be stockpiled separately from other soils.

G. Environmental Analysis Requirements:

1. In addition to any laboratory analysis required specific to the fill type, analyze soil samples (excluding Bedding Stone Gravel Fill and Rip Rap) for RCRA 8 Metals, PCBs by EPA Method 8082, VOCs by EPA Method 8260, and SVOCs by EPA Method 8270C at a laboratory that is appropriately licensed to perform the analysis in the State of New York. Forward analytical results to the CM/Engineer at least two weeks prior to the material being imported to the Site. NYSDEC approval is required prior to use.

2. The imported fill shall meet the Commercial Soil Cleanup Objectives listed in Appendix 5 of DER-10/Technical Guidance for Site Investigation and Remediation published by the NYSDEC to meet the environmental analysis requirements for the Project.

2.3 GEOCOMPOSITE GEOTEXTILE FABRIC

A. Furnish geocomposite geotextile Tenflow 770-2 Double Sided, Tenax Corporation, Baltimore, Maryland, or CM/Engineer-approved equivalent, for placement above the Low Permeability Material.

B. Use underground warning tape that is non-detectable, high visible polyethylene tape of a different color than the Geocomposite geotextile fabric.. Print warning text in Spanish and English “Danger - Do Not Dig - Peligro no Excavar.” The warning may be printed directly on the Geocomposite geotextile fabric.

2.4 WOVEN GEOTEXTILE

A. Furnish woven geotextile Carthage Mills’ Carthage 6%, Carthage Mills, Cincinnati, OH, or CM/Engineer-approved equivalent, for placement below the articulated concrete block mats.

B. A woven geotextile made from monofilament plastic yard that consists of long-chain synthetic polymers, such as polypropylene, polyethylene, or polyester.

C. Finished edges to prevent the outer fiber from pulling away from the geotextiles.

D. Manufactured free from chemical stabilizers or heat bonding that can decrease the permeability of the geotextile.

E. Free of defects or flaws that could affect its physical and/or filtering properties.

F. Meet the requirements of AASHTO M288 Class 2.

2.5 ARTICULATED CONCRETE BLOCK MATS

A. Furnish articulated concrete block mats Armorflex Open Class 30S, Contech Engineered Solutions, West Chester, Ohio, or CM/Engineer-approved equivalent for placement as shown on the drawings.

B. Conform to the following:

1. Cementitious Materials: Materials conforming to one or more of the following applicable ASTM specifications:

a. C150 Portland Cement.

b. C595 Blended Cements.

c. C207 Hydrated Lime Types.

d. C618 Pozzolans.

2. Compressive Strength: Average 28 day unit strength of 4,000 psi and an individual unit minimum strength of 3,500 psi.

3. Aggregate: ASTM C33 for normal weight aggregate.

4. Moisture Absorption: Average maximum absorption of 10 lbs/ft3 and an individual unit maximum absorption of 12 lbs/ft3.

5. Resistance to Freeze Thaw: Manufacturer to provide field performance of concrete unit's durability.

6. Color: Gray.

7. Visual: Sound and free from defects that would interfere with the proper placement of the unit or impair the strength or performance of the concrete blocks mats.

PART 3 EXECUTION

3.1 CAMP REQUIREMENTS

A. The Community Air Monitoring Plan will be conducted by the CM/Engineer. Implement airborne dust and vapor suppression measures required to comply with the CAMP and as directed by National Grid or the CM/Engineer. These actions are indicated in the Contract Drawings and may include any of the following or other measures to minimize air emissions:

1. Applying water on exposed soil surfaces and/or roadways to suppress dust.

2. Covering working areas of exposed soils or stockpiles with tarpaulins, vapor suppressing foam, or other vapor controls.

3. Modifying the means and methods of the Work (i.e. using different or additional equipment, etc.).

4. Modifying the production rate (i.e. excavation rate, etc.).

5. Changing the sequence of activities.

3.2 EXCAVATION

A. Perform excavations in accordance with OSHA regulations.

B. Perform the Holder No. 2 excavation to the lines and grades indicated on the Contract Drawings, and to depths as directed by the CM/Engineer.

C. Ensure that all equipment exceeding 4 tons does not traverse or operate within a 40 feet setback from the existing bulkhead.

D. Conduct all Holder related excavation operations that will disturb impacted fill contents of the holder inside a temporary enclosure in accordance with Section 13 31 33 – Framed Fabric Structures.

E. Review and evaluate existing conditions to determine the type of equipment and safety measures needed for performing excavation in a safe manner.

F. Remove the overburden asphalt and soil above Holder No. 2 and large debris that is not impacted with MGP tar, and stockpile separately for possible reuse. Remove the impacted fill contents of Holder No. 2 and dispose off-Site at a facility approved by National Grid. Start the excavation at the western side of the Holder and progress generally eastward. Progressively backfill in accordance with Part 3.4 of this specification section.

G. Visually evaluate the stability of the Holder as excavation operations proceed. The Contractor shall maintain the integrity of the Holder walls until the contents have been removed.

H. Demolish and separately stockpile the portion of the Holder wall and foundation to meet the final grade of the Access Road as shown on the Contract Drawings.

I. Manage excavated materials in accordance with the Section 02 61 00 – Removal and Disposal of Contaminated Materials. Excavated material handling includes:

1. Excavate subsurface soil to contours, elevations, and dimensions indicated in the Contract Drawings.

2. Whenever possible, perform the excavation of impacted material as a direct-load operation.

3. Transport and dispose of excavated soil from the Holder designated for off-site disposal at a regulated, licensed, and National Grid-approved thermal desorption facility.

4. Segregate bulk solid waste and construction debris encountered during Holder excavation from excavated soil to allow for acceptable disposal of soil at the thermal disposal facility, landfill, or material reuse on site, as provided by the CM/Engineer.

5. Gravity dewater excavated soil such that the water is allowed to drain back into the excavation or captured within lined stockpile areas.

J. Perform excavations using proper shoring and bracing and/or excavation sloping/benching to ensure slope stability. Perform Holder excavation using trench box or slide rail system to ensure excavation stability and protection of nearby gas pipelines. The former holder's structural characteristics, condition, structural features, self-supporting abilities, and ability to support induced loads are unknown. Neither the Owner nor the Engineer guarantees the condition, characteristics, configuration, or structural integrity of the former holder wall. Conduct all soil removal activities in this area in consideration of the limited information pertaining to the former holder foundation.

K. The Holder excavation portion of the Work will be above and below a perched water table. Perform the excavation below the perched water table using techniques to minimize the water content of the excavated soil such that they can be transported in trucks without stabilization.. Dewatering the excavation, in accordance with Specification Section 031 23 19, by pumping of perched groundwater contained within the Holder. Use slotted or perforated buckets to allow water trapped in the bucket drain back to the excavation. Use short term stockpiling within the excavation to allow excavated soil to drain as space and equipment allow. Use stabilization only for soils that are inherently too wet and cannot be dried sufficiently using the above techniques. Stabilization may only be used with the approval of the CM/Engineer.

3.3 MATERIAL REUSE

A. Excavated material that is not visibly impacted with MGP tar may be re-used as backfill on the Site below the engineered soil cap depth, when approved by the CM/Engineer.

B. Stockpile excavated material designated by the CM/Engineer on the National Grid property according to the Contract Drawings.

1. Immediately cover all stockpiles.

2. The CM/Engineer will perform any and all visual inspection or analytical work to confirm that the stockpiled material may be reused as backfill on-Site.

3. When the evaluation of stockpile material is complete, the CM/Engineer will direct the Contractor to either use the material as backfill on-site or direct that it be disposed of at one of the National Grid-approved off-Site disposal facilities.

4. Material that is reused as backfill must be placed below the engineered soil cap.

3.4 BACKFILL

A. Backfill the portion of the excavation with Subsoil Fill or approved Reuse Material in accordance with the Contract Drawings.

B. Do not place backfill without the approval of the CM/Engineer. Placement of backfill prior to CM/Engineer approval is at the Contractor's risk and may require removal at the Contractor's cost. Commence backfill placement and compaction upon confirmation of the horizontal and vertical limits of the excavation; whichever is applicable, and as directed by the CM/Engineer.

C. Dewater the excavation as necessary to remove excess water during backfilling operations and to prevent a surface release of groundwater. Ensure that groundwater within the excavation does not overtop the Holder or excavation support system or excavation walls during backfill operations.

D. Place backfill using a method that does not cross-contaminate backfill, or disturb/damage adjacent structures and property.

E. Mechanically place stone fill to the lines and grades shown on the Drawings and in accordance with NYSDOT Standard Specification Section 620.

F. Maintain moisture content within +3 to –3 percent of the backfill optimum moisture content to attain required compaction density.

G. For Subsoil Fill, place in maximum 6-inch lifts and compact using a minimum of 4 passes of vibratory compaction equipment to the satisfaction of the CM/Engineer, prior to placing the subsequent lift of material.

H. Perform laboratory and field geotechnical testing.

I. Place and compact the Subsoil Fill in the footprint of the Access Road to the percent of the maximum dry density (as determined by Modified Proctor during the borrow source evaluation) indicated in the table below. Do not place overlying lifts of backfill until in place compaction tests indicate that the current grade layer has been compacted in accordance with this criterion.

J. Place and compact a 6-inch Bedding Stone layer as Access Road base to the line and grade shown in the Contract Drawings.

Project Area	Percent Compaction (%)	Test Frequency (per lift of material)
Access Road	90	50 ft by 50 ft
Holder	90	50 ft by 50 ft

K. Utilize an appropriately licensed testing Subcontractor that is certified to test soil by ASTM D6938-latest edition, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods-Shallow Depth.

3.5 GEOTEXTILES

A. Shipping and Packaging

1. Provide geotextile rolls uniformly rolled onto a cardboard core and wrapped in opaque plastic to protect the material from moisture, damage, and ultraviolet (U.V.) exposure during shipping and storage. Leave protective wrapping on the geosynthetic until installation.

2. Externally tag each roll for easy field identification. External tagging includes name of manufacturer, product type, product grade, lot number, and physical dimensions (length and width).

3. Store rolls in a manner that protects them from the elements. If stored outdoors, elevate and protect the rolls with a waterproof cover in addition to the protective wrapping on each roll. Store and protect rolls as recommended by the manufacturer.

4. Reject the geosynthetic if it has defects, rips, holes, flaws, mottled color (indication of poor UV resistance), deterioration or damage incurred during manufacture, shipping, storage or handling. Rejected geosynthetics shall be at no additional cost to the Owner.

5. Prepare the surface to receive the geosynthetic in accordance with the contract documents and in accordance with manufacturers' recommendations.

B. Placement of Geotextile

1. Place the geotextile with its machine direction oriented down slope. Place geotextile to avoid tear or excessive stretch of the fabric by fill or mats. Lay geotextile smooth and free of tension, stress, folds, wrinkles, or creases. Anchor geotextile at the top to hold it in position during placement of the fill or mats.

2. Overlap successive sheets of geotextile in such a manner that the upstream sheet is placed over the downstream sheet, and the upslope sheet is placed over the downslope sheet. Provide a minimum of 18 inches of overlap for adjacent sheets of geotextile, or overlap the seams a minimum of 3 inches and sew the seam. Provide a 5-foot minimum offset between adjacent roll ends.

3. Use overlapping J-type seams with a "lock-type" stitch for all seams. Double sew all seams and place all sewn seams with the seam up.

4. Protect the geotextile at all times during construction from contamination by surface runoff. Remove and replace contaminated geotextile with uncontaminated geotextile. Cover the geotextile within one day of placement.

5. Replace or repair geotextile that is punctured, torn, or otherwise damaged or contaminated before or during placement of fill or papers as directed by the Engineer at no additional cost to the Owner. Place repair geotextile over an area extending 3 feet beyond the perimeter of the tear or damage. Overlap sides and edges of patches as described above.

6. Do not allow equipment or other traffic on unprotected geotextile.

3.6 ARTICULATED CONCRETE BLOCK MATS

A. Preparation

1. Proof roll subgrade under the supervision of the Engineer or Owner, and take appropriate actions to correct soft or yielding materials.

2. Grade foundation to the required grades and elevations.

B. Installation

1. Remove obstructions, such as roots and projecting stones, and soft or low density areas of soil. Backfill overexcavated or low areas with Subsoil Fill in accordance with this section. Excavate and prepare key-in trenches as shown on the Drawings. Shape all grade transitions with a radius of at least 3 feet.

2. Compact the placement surface with a minimum of 4 passes from vibratory compaction equipment. Grade and dress subgrade per manufacturer's recommendations prior to placing geotextile. Areas on which filter fabric and Articulated Concrete Block Mats are to be placed shall be graded and compacted to provide the final construction lines and grades shown on the Contract Drawings and to a tolerance such that the top level of each block will be within ½ inch of the top level of adjacent blocks. The slope shall be graded to a smooth plane surface to ensure that intimate contact is achieved

between the slope face and the geotextile (filter fabric), and between the geotextile and the entire bottom surface of the cellular concrete blocks.

3. Place geotextile over subgrade immediately prior to installing Articulated Concrete Block Mats. Secure geotextile and provide slack as necessary to prevent shifting or tension during mat installation. All placement and preparation should be performed in accordance with ASTM D6884-03. The filtration geotextile will be placed directly on the prepared area, in intimate contact with the subgrade, and free of folds or wrinkles.

4. If assembled and placed as large mattresses, the cellular concrete mats shall be attached to a spreader bar or other approved device to aid in the lifting and placing of the mats in their proper position by the use of a crane or other approved equipment. The equipment used should have adequate capacity to place the mats without bumping, dragging, tearing or otherwise damaging the drainage layer or underlying fabric. The mats shall be placed side-by-side and/or end-to-end, so that the mats abut each other. Mat seams or openings between mats greater than two (2) inches and less than the dimensions of a full block as used in the mat shall be filled with 4000 psi. non-shrink grout, concrete or approved equal.

5. Place Articulated Concrete Block Mats in accordance with ASTM D6884-03. Follow lines and grades shown on the Drawings. Place the Articulated Concrete Block Mats in such a manner as to produce a smooth plane surface in intimate contact with the geotextile and having intimate contact between the geotextile and the subgrade. Prepare subgrade and place Articulated Concrete Block Mats so that no individual block surface protrudes more than one-half inch above or below the upper surface of adjacent blocks.

6. Construct the transition from the Articulated Concrete Block Mats to adjacent landscaped areas as shown on the Drawings using concrete fillets to prevent abrupt grade changes.

7. Termination or transition trenches shall be backfilled and flush with the top of the blocks. Backfilling of trenches shall be completed in a timely fashion.

8. Fill block voids with topsoil. After initial topsoil placement, wet or moisten topsoil to facilitate consolidation of topsoil into voids. Re-cover with topsoil. Push topsoil into block voids with machinery or tools that do not damage the blocks. Continue this process until topsoil is firmly packed into voids.

9. Spread permanent seeding and establish healthy grass growth within blocks. Coordinate with Section 32 90 13.

3.7 FIELD CONTROL QUALITY

A. If compaction testing indicates that the Work does not meet the specified requirements, provide additional compaction, or place soil in thinner lifts, or both.

B. The CM/Engineer reserves the right to reject backfill that differs visually from the identified source material and to randomly test backfill materials for conformance with the specifications. Remove backfill that fails to meet the Product specifications.

C. Notify Engineer at least 48 hours prior to placement of geosynthetics and articulated concrete block mats for visual inspection of placement.

3.8 CONSTRUCTION METHODS

A. Establish excavation rates that will permit continuous Work while accommodating the receiving capacity of the selected treatment/disposal facilities.

B. Due to limited space, excavate soils designated for transport and disposal as a direct-load operation whenever possible.

C. Due to limited space, plan excavation, stockpiling and backfilling of Clean Excavated Material to minimize handling and allow for sufficient stockpile areas.

D. Divert or otherwise prevent surface water from entering excavations to the greatest extent practicable without causing damage or flooding to adjacent properties.

END OF SECTION 31 23 00

SECTION 31 23 19
DEWATERING

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the dewatering of the excavation areas.

1.2 SUBMITTALS

A. Submit information in the dewatering section of the Site Operations Plan that details the principal components of the system and contains narratives on the installation, operation, maintenance, and removal of the dewatering system.

B. Include information in the Site Operations Plan that details the excavation, backfill, and dewatering sequence that achieves the required dewatering, without exceeding the volumetric discharge limits imposed by the governing permit.

C. Include in the submittal drawings of the proposed dewatering system, calculations showing the basis for the sizing of equipment, and a monitoring program that will demonstrate compliance with these Specifications.

D. Submit a detailed dewatering plan in the Site Operations Plan to the CM/Engineer at least 2 weeks prior to the start of excavation.

E. Submit all reports required by the regulatory agency that has issued the discharge permit, and comply with any other requests for reports that may be required to maintain all permits necessary for dewatering in force during the duration of the Work.

1.3 SEQUENCING AND SCHEDULING

A. Continuously dewater the excavation until the target excavation elevations have been achieved and the area has been backfilled as specified in Specification 31 23 00 – Excavation and Fill.

B. Coordinate and schedule the dewatering Work in a manner that minimizes the quantity of water pumped while not affecting the excavation and backfill schedule.

1.4 QUALITY CONTROL

A. Establish, maintain, and document quality control of the dewatering system in a manner acceptable to the CM/Engineer, and the regulatory agency that has issued the discharge permit.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Furnish, install, and operate pumping equipment of sufficient capacities to meet the requirements for the removal of groundwater, stormwater, and surface runoff water from the excavation areas as necessary to complete the excavation and backfilling Work, with a dewatering capacity of not less than 200 gpm.

B. Keep on site or have immediate access to, additional pumps of sufficient capacity to maintain dewatering activities during any pump breakdown, maintenance, or in case of flooding.

C. The excavation dewatering system design should have redundant features such as adequate standby pumping capacity, valves, and piping so that damage to or failure of a principal component of the system will not result in the failure of the entire system.

D. Provide sufficient suction and discharge hose or piping for transferring pumped liquids without causing erosion, sedimentation, or other adverse consequences.

E. Provide freeze protection for all dewatering hoses, piping, and pumping equipment necessary to execute the Work throughout the winter months, including but not limited to: insulation, heat wraps, heaters, and/or enclosures. Freeze protection chemicals or solutions shall not be used on Site without prior approval of the CM/Engineer.

F. Equipment for dewatering may be new or used, but shall be suitable for the Work and maintained in good condition.

G. All dewatering equipment shall remain the property of the Contractor or Subcontractor.

H. Decontaminate dewatering equipment in accordance with Specification 01 50 00 – Temporary Facilities and Controls, and remove the equipment from the Site at the completion of the Work.

PART 3 EXECUTION

3.1 DEWATERING-GENERAL

A. Furnish, install, operate, and remove a dewatering system to allow excavation to the depths shown on the Contract Drawings, including removal of the liquid contents of the Gas Holder 2.

B. The water from the active work areas or water in contact with exposed impacted soils may contain MGP residuals. This water will be segregated and pumped to a water treatment system prior to discharge in accordance with the governing discharge permit. Incorporate the design of the system into the Contractor Site Operations Plan after it has been reviewed and approved by the CM/Engineer.

C. Operate the dewatering system in compliance with the discharge permit.

D. Visit the Site, be aware of its restrictions, and review the sub-surface and geotechnical information.

E. Furnish, at a minimum, all labor, materials, and equipment, required to perform all operations required to design, install, test, pump, measure, and maintain the excavation dewatering equipment and water storage systems, including the storage tank, ditches, dikes, sandbags, wells, well points, sumps, electric power supply and distribution as required to dewater the excavations so that the Work can be conducted under controlled conditions. Decontaminate and demobilize all dewatering equipment and materials after completing the excavation and backfill Work.

F. Coordinate dewatering, excavation, and backfill so that the volumes of water generated during dewatering can be treated and discharged without exceeding the treatment system discharge limits.

G. Test components of the excavation dewatering system, such as the individual wells and well points, immediately after their installation, so as to verify design assumptions and demonstrate yields without suspended solids.

H. Conduct localized dewatering, as necessary, to perform excavation and restoration Work.

I. Repair or replace damaged pumps, piping, hoses, tanks, and all other dewatering equipment and materials within four working hours, if damaged. Damage includes any pump and power failures, leaks, breaks, clogs, or other conditions that adversely affect the dewatering system or release contaminated water.

J. Grade the excavation area using run-on/runoff controls including but not limited to slopes, berms, and sumps in conjunction with the dewatering systems to channel water away from the immediate work areas to minimize dewatering and prevent undue impediments to the soil inspection and excavation progress.

K. Prevent any impacted water from contacting soils, or water outside of the active excavation area. If environmental contamination results from the Contractor's failure to control impacted water, remove the contamination, to the satisfaction of the CM/Engineer, at no additional cost.

L. After the excavation and removal of water is completed and inspected by the CM/Engineer, backfilling may proceed.

M. Install, operate, and remove the dewatering systems in accordance with applicable Federal, State, and local Laws and Regulations, permits, and generally accepted industry practices.

N. Safety of personnel, and protection of off-Site facilities and designated on-Site facilities during dewatering Work, shall be solely the responsibility of the Contractor.

3.2 SAMPLING AND ANALYSES

A. Water sampling and analysis shall be performed by the Contractor in accordance with Specification 44 01 40 – Operation and Maintenance of Water Treatment Equipment.

END OF SECTION 31 23 19

SECTION 31 62 33
MICROPILE-ROCK ANCHOR

PART 1 GENERAL

1.1 SUMMARY

A. This specification, along with the drawings, encompasses the furnishing of all designs, materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and installation techniques required for testing and installing micropiles and pile-top attachments to be used as vertical and battered compression piles and battered tension rock anchors.

B. The work consists of furnishing all necessary supervision, labor, materials, electrical power, drilling fluids, and equipment to perform all work necessary to install and test the micropile/rock anchors at the Troy Smith Avenue former MGP Site per the specifications described herein, and as shown on the design drawings. Potable water is available on-site. The contractor shall install a rock anchor/micropile system that will develop the compressive and tensile load capacities indicated on the drawings. The micropile load capacities and measurements shall be verified by testing as specified herein.

1.2 ALLOWABLE TOLERANCES

A. Centerline of piling shall not be more than 2 in. from indicated plan location.

B. Pile-hole alignment shall be within 1 degree of design alignment.

C. Top elevation of pile shall be within +1 in. to –2 in. of the design vertical elevation.

D. Centerline of core reinforcement shall not be more than ¾ in. from centerline of piling.

1.3 REFERENCE CODES AND STANDARDS

A. The following publications form a part of this specification to the extent indicated by the specific citations in other paragraphs of this Specification. In case of conflict, the particular requirements of this specification shall prevail. The latest publication as of the issue of this specification shall govern, unless indicated otherwise. Code and Standards are referenced by the designation only in the text.

B. American Society for Testing and Materials (ASTM), latest editions:

1. ASTM A36 or A572 Structural Steel
2. ASTM A252 Welded and Seamless Steel Pipe Piles
3. ASTM A615 Deformed and Plain Billet Steel Bars for Concrete
4. ASTM C109 Compressive Strength of Hydraulic Cement Mortar

5. ASTM C150 Portland Cement
6. ASTM C31/C31M Making and Curing Concrete Test Specimens in the Field
7. ASTM C 33 Concrete Aggregates
8. ASTM C39/C39M Compressive Strength of Cylindrical Concrete Specimens
9. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
10. ASTM C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
11. ASTM D1143 Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
12. ASTM D3689 Method of Testing Individual Piles Under Static Axial Tensile Load

C. American Association of State Highway and Transportation Officials (AASHTO), latest editions:

1. AASHTO T26 Quality of Water to be Used in Concrete
2. AASHTO M275 Uncoated High-Strength Steel Bar for Prestressing Concrete.
3. AASHTO M85 Standard Specification for Portland Cement
4. AASHTO M31 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
5. AASHTO M194 Standard Specification for Chemical Admixtures for Concrete

D. American Welding Society (AWS), latest editions:

1. AWS D 1.1 Structural Welding Code – Steel
2. AWS D 1.2 Structural Welding Code – Reinforcing Steel

E. American Petroleum Institute (API), latest editions:

1. API 5CT (N80) Specification for casing and tubing
2. API RP 138-1 Recommended Practice – Standard Procedure for Field Testing Water Based Drilling Fluids

F. American Society of Civil Engineers, latest editions:

1. ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations

2. ASCE – 7-10 – Minimum Design Loads for Building and other Structures

G. Post Tensioning Institute (PTI), latest edition:

1. PTI Recommendations for Prestressed Rock and Soil Anchors." (1996).

H. International Building Code (IBC), 2009.

I. Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1910 and Part 1926.

J. FHWA Micropile Design and Construction Guidelines, Publication No FWHA-SA-97-070.

1.4 CONSTRUCTION SUBMITTALS

A. At least 14 calendar days before the planned start of micropile construction, the Subcontractor shall submit complete construction submittals to the Engineer for review and comment. The Subcontractor will not be allowed to begin pile work until the submittal requirements are satisfied and found acceptable by the Engineer. Changes or deviations from the approved submittals must be re-submitted for approval. No adjustments in contract time or delay claims will be allowed due to incomplete submittals.

B. The Subcontractor shall prepare a Micropile/Rock Anchor Installation Plan to demonstrate, to the satisfaction of the Engineer, the dependability of the equipment, techniques, and source of materials to be used on the project within 14 days of starting field work. Reference to successful completion of projects with similar pile sizes in similar subsurface conditions using the proposed equipment and procedures should be included. The components of the plan shall meet the requirements contained in this specification. This plan shall include, but not be limited to, the following items:

1. List and sizes of proposed equipment, including drilling rigs, augers and other drilling tools, pumps for grout, mixing equipment, automated monitoring equipment, and similar equipment to be used in construction, including details of procedures for calibrating equipment as required.

2. Design shop drawings (signed and sealed) of the micropiles/rock anchors shall be included as an attachment.

3. Step-by-step description of micropile/rock anchors construction procedures including potential safety, environmental and other hazards associated with the work process.

4. A plan describing the means, methods, and sequence of pile installation, fluid re-circulation, and spoil collection; this must be worked out with the Engineer to match the overall project schedule, distance restrictions, and construction plan.

5. Target drilling and concreting or grouting parameters (along with acceptable ranges) for pile installation including: drilling penetration rates, torque, applied, grout pressures, and grout volume factors.
6. Details of methods of reinforcement placement, splicing, and support for reinforcing at the top of the micropile and methods for centering the center bar within the grout column.
7. Mix designs for all grout to be used on the project, including water/cement ratio, slump loss versus time curves and strength development versus time curves for mixes;
8. Equipment and procedures for monitoring micropile installation.
9. Equipment and procedures for monitoring and recording grout pressures and volumes placed during installation.
10. Equipment and procedures for fluid re-circulation and spoil collection and separation to prevent release of drilling fluid, spoil, and spray to the adjacent surface water.
11. Contingency plans for equipment failure during drilling or concreting operations (grout pump, monitoring equipment, etc.).
12. Procedures for protecting adjacent structures that may be adversely affected by foundation construction operations, including a monitoring plan.
13. Verification Load Test, loads and location as detailed further in Pile Load Test section below.
14. Other required submittals shown on the plans or requested by the Engineer.
15. Submit OHSA required material testing data sheets for all chemical and petroleum based fluids used for the project.
16. The Subcontractor shall prepare a health and safety plan and work hazard analysis.

1.5 LOAD TEST RESULT RECORDS

A. The Subcontractor shall submit (within the Micropile/Rock Anchor Installation Plan) the proposed load test geometry, list of materials, load test procedures, equipment and methods including proposed reaction frame/system to the Engineer for approval prior to testing.

B. The Subcontractor shall prepare a test loading system design, signed and sealed by the subcontractor's licensed New York's Professional Engineer, and submit it to the Engineer of Record.

C. The Subcontractor shall provide access to Engineer of Record and design team to the test pile arrangement and provide personnel to monitor and document the

verification load test and anchor proof tests. The subcontractor shall ensure the verification tests are performed in accordance with applicable ASTM standards and satisfy the requirements of International Building Code 2009. A complete and accurate record of the installation and testing of all micropile verification tests shall be provided. The records shall indicate the pile locations, diameters, lengths of casing, elevation of bottom and top of pile, reinforcement size/type, and the incremental and cumulative deflection readings for all load increments. The load test data shall be complied and summarized in a Load Test Report that is signed and sealed by the Subcontractor's licensed New York Professional Engineer and submitted to the Engineer of Record.

D. Any unusual condition encountered during test pile installation and the performance of the load tests shall be reported immediately to the Engineer.

E. The Micropile/Rock Anchor Installation Plan will clearly indicate the QA/QC tasks to be performed by the Subcontractor and its representative during the verification load and proof tests.

F. All deviations from this specification that occur must be documented and referred to the Engineer of Record for resolution.

1.6 PRE-CONSTRUCTION SITE VISIT

A. Subcontractor shall perform a site visit prior to submitting a proposal to become familiar with the site specific conditions that are critical to completion of this contract.

PART 2 PRODUCTS

2.1 WATER

A. Water for mixing grout shall be potable, clean and free from substances which may be in any way deleterious to grout or steel. If water is not potable, it shall be tested in accordance with AASHTO T26 for acceptability.

2.2 ADMIXTURES

A. Admixtures shall conform to the requirements of ASTM C494 (AASHTO M194). Admixtures which control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to the review and acceptance of the Engineer. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. Their use will only be permitted after appropriate field tests on fluid and set grout properties. Admixtures with chlorides shall not be permitted.

2.3 CEMENT

A. All cement shall be Portland cement conforming to ASTM C150 (AASHTO M85) Type I, Type II, Type I/II, or Type III, and shall be the product of one

manufacturer. If the brand or type of cement is changed during a project, additional grout mix tests shall be conducted to ensure consistency of quality and performance in situ.

2.4 FILLERS

A. Inert mineral fillers such as sand, flyash, and granulated blast furnace slag may be used in the grout in special situations (e.g., presence of large voids in the ground, when grout take and travel are to be limited) as approved by Engineer of Record.

2.5 CENTRALIZERS

A. Centralizers and spacers shall be fabricated from schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood shall not be used. Centralizers shall be securely attached to the reinforcement; sized to position the reinforcement within 3/8 inch of plan location from center of pile; sized to allow grout tremie pipe insertion to the bottom of the drill hole; and sized to allow grout to freely flow up the drill hole and casing and around the reinforcing bar.

2.6 PERMANENT CASINGS

A. Permanent casings should be produced from new billet steel. The casing may be "Mill Secondary," however restored or recycled products shall not be allowed. The casing shall be smooth steel cylinders having an outside diameter and a wall thickness as indicated on the plans.

B. Permanent steel casing shall meet the tensile requirements of grade API N80 with minimum yield strength of 80 ksi.

C. Permanent steel casing shall have special high-strength machined flush joint threads to join the pipe sections.

D. Internal flush-couple threaded joints shall develop at least 50% of the ultimate required nominal strength and resistance of a solid pipe.

E. The steel casing shall not be spliced without approval of the Engineer of Record.

2.7 REINFORCING

A. Recommended reinforcing bars shall be new, high-strength steel bars, Grade 75 or higher, with diameters as shown on the drawings.

B. When a bearing plate and nut are required to be threaded onto the top end of reinforcing bars for the pile top to footing anchorage, the threading may be continuous spiral deformed ribbing provided by the bar deformations. Acceptable threaded reinforcement bars shall be as manufactured by Dywidag, Williams, or other approved equal. Reinforcement splicing shall be accomplished using mechanical coupler systems provided by the reinforcement manufacturer. The coupling system shall be capable of developing the full design loading specified and have an ultimate strength no less than the thread bar.

C. All bearing plates, hex nuts, washers, threaded bar connectors and/or coupling systems shall be Grade 75 and compatible with the threaded reinforcement used for the micropiles.

2.8 GROUT

A. The grout to water to cement ratio shall not be greater than 0.5, and the neat cement-water mix design shall be capable of developing the required load capacities with a minimum 3-day compressive strength of 3,500 psi and a 28-day compressive strength of 5,000 psi.

PART 3 EXECUTION

3.1 MICROPILE DRILLING

A. The micropile/rock anchor installation techniques shall be such that they are consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project. The micropile contractor shall select the drilling method(s) and the grouting procedures used for the installation of the micropiles/rock anchors, subject to the approval of the Engineer.

B. Manage drilled materials in accordance with the Section 02 61 00 – Removal and Disposal of Contaminated Materials. Drilled material handling includes:

1. Drill fluid recirculation.

2. Whenever possible, perform the handling of impacted material as a direct-load operation.

3. Transport and dispose of cuttings at a regulated, licensed, and National Grid-approved thermal desorption facility.

C. The drilling equipment and methods shall be suitable for drilling through the till and shale bedrock conditions to be encountered, with minimal disturbance to these conditions or any overlying or adjacent structure or service. The borehole must be open to the defined nominal diameter, full length, prior to placing grout and reinforcement.

D. Unless otherwise directed by the Engineer, all micropiles shall be drilled to the depths as required to satisfy the allowable loads referenced on the drawings. The drawings shows estimated depths to which holes shall be drilled to obtain required penetration and suitable capacity within weathered to sound shale bedrock.

E. All installation techniques shall be determined and scheduled such that there will be no interconnection or damage to piles in which grout has not achieved final set.

F. Tension rock anchor drilling shall be executed by rotary drilling methods using duplex or other approved drilling methods that can advance a rock socket as indicated on the plans. Compression piles shall be drilled with a sacrificial tri-cone bit. Blasting will not be permitted for performing any item of work covered

under this Specification. The Subcontractor shall make frequent checks on the battered orientation or plumbness of the casing during drilling.

G. After the Subcontractor has drilled to the design depth, the depth shall be confirmed by the Inspector before grouting. The Subcontractor shall provide all the apparatus necessary for the inspection. The Inspector shall monitor the rate of penetration of the drilling equipment and observe the rock cuttings to ascertain that suitable rock has been reached and sufficiently penetrated to achieve the design socket/bond length. The Inspector shall be notified and scheduled by the Subcontractor in a timely manner to permit complete inspection of the drilling and installation of all micropiles/rock anchors.

1. Should it be determined by the Inspector or the Engineer that a hole drilled to the estimated elevation has not reached suitable rock, or that required penetration into suitable material has not been made, the Inspector or Engineer will direct that the hole be drilled deeper. Such over-depths beyond the indicated bottom-of-hole elevations will, if directed or authorized by the Inspector or Engineer, be paid at Buyer's expense. Unauthorized over-depths, and the resulting increase in concrete and reinforcement, will be at the expense of the Subcontractor.

H. Centralizers shall be provided at 10-ft maximum linear spacing on central reinforcement. The uppermost centralizer shall be located a maximum of 5-ft from the top of the micropile. Centralizers shall permit the free flow of grout without misalignment of the reinforcement.

I. The central reinforcement steel with centralizers shall be lowered into the stabilized drill holes to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole such that there will be no interconnection or damage to piles in which the grout has not achieved final set.

J. Out-of-Tolerance Holes:

1. When, upon inspection, a drilled hole exceeds tolerance limits as indicated in above, the Engineer will select the method or combination of methods to be used by the Subcontractor in correcting or compensating for the defect. Such corrective or compensatory measures as may be required to make the rock socket or anchor bond zone acceptable shall be performed by the Subcontractor at no additional expense to the Buyer. The Subcontractor will be responsible for any additional grout or reinforcing required to correct the work. Depending upon the nature and severity of the defect or defects, the Engineer will direct that one or a combination of the following corrective measures be taken:

a) An increase, as directed, in total reinforcement in the micropile/rock anchor.

b) Install additional micropiles/rock anchors.

K. Conflicts with Underground Features:

1. There are no known conflicts within the driving lines for micropiles/rock anchors.

2. If an obstruction is hit during drilling, the piling contractor shall notify the Engineer of Record immediately.

3.2 DRILL HOLE CLEANOUT

A. After completion of drilling and all other operations that would produce loose material in the bottom of the holes, each hole shall be thoroughly flushed with water to clear loose material, soil/mud and broken rock. Each drilled hole shall be protected against entry of water and shall be kept covered until filled with grout, unless clean-out or other work is in progress in the hole.

B. In compression piles drilled with a sacrificial bit, the drill string shall be stroked along the length of the bond zone during flushing to help remove loose material.

C. Grout shall be placed as soon as possible following approval of the drilled hole by the Inspector, but in no event shall the hole remain unfilled with grout more than one (1) night without approval of the Engineer. If completed micropile holes are allowed to stand empty overnight, they shall be re-cleaned and re-inspected just prior to placing grout. If requested by the Inspector to do so, the Subcontractor shall reposition the drilling equipment over the hole, remove all loose debris from the hole and drill it one (1) foot deeper. The repositioning of the equipment, labor, additional grout and the additional reinforcing steel, if any, shall be at the expense of the Subcontractor. The Subcontractor will be responsible for any additional grout or reinforcing required to correct the work at no additional expense to the Buyer.

3.3 REINFORCING

A. General

1. All indicated reinforcing, and all additional reinforcing which may be required due to authorized over depths, will be furnished, assembled and placed by the Subcontractor.

2. Stiffeners, spiral spacers, banding rings (if used), and bracing necessary for the installation of the reinforcing bars shall be furnished and installed by the Subcontractor at no additional expense to the Buyer.

3. The reinforcing steel shall be assembled and placed by the Subcontractor to the elevations as indicated on the design drawings. When a hole has been drilled deeper than what is indicated on the aforementioned design drawings, the main reinforcement shall be extended downward to maintain its originally planned position relative to the bottom of micropile.

4. There will be no required prestressing of the center thread bars required for the "passive" compression of tension piles. The full strength couplers shall not interfere with full length grouting doe before or after reinforcing installations.

B. Packaging

1. Reinforcing steel shall be bundled and tagged in accordance with the Manual of Standard Practice, latest revision thereof, as published by the Concrete Reinforcing Steel Institute.

2. Reinforcing steel shall be handled and stored in a manner to avoid distortion, excessive rusting, and objectionable coatings of paint, oil, grease, dried mud, dried mortar or other materials. Reinforcing steel shall be stored so that each may be identified after bundles are broken.

C. Assembling

1. Except as otherwise specifically approved in writing by the Engineer, all reinforcing steel shall be inspected by the Inspector, then placed in its inspected and approved hole.

2. Details of reinforcement for micropiles including size and type of the center bars and splice locations shall be as shown on the drawings. Reinforcing details not otherwise defined shall be in accordance with ACI 318.

3. Reinforcing steel may be cut by shearing or sawing with cutting wheel. Flame cutting or the use of heat to bend or straighten reinforcing steel will not be permitted unless the entire operation is approved in advance by the Engineer. Reinforcing steel reduced in section shall not be used.

a) Lengths of casing and reinforcing steel to be spliced shall be secured in proper alignments and in such a manner that no eccentricity between the axes of the two lengths spliced or angle between them results.

D. Placement

1. Before being placed, the reinforcing steel shall be thoroughly cleaned of loose or flaky rust, mill scale, mud or other substances, including ice or frost, which would reduce or destroy the bond with the grout.

2. In setting, care shall be taken to prevent deformation of the reinforcement and/or dislodgement of material into the hole. Sidewall or surface material knocked into holes during lowering operations shall be promptly removed by the Subcontractor.

3.4 GROUT PLACEMENT

A. Preparation for Placement

1. Placement of grout in a drilled hole shall not proceed until approval for placement is given by the Inspector. Approval for grouting will not be given until the following requirements are met.
2. The hole is free from accumulations of loose material.
3. Approved reinforcing is in place in the hole and properly positioned. Accurate plan location and vertical alignment has been verified.

B. Placing Grout

1. The Subcontractor shall submit to the Engineer his grouting procedure and the desired grouting pressure for approval. The Subcontractor is responsible for estimating the grout take. There will be no extra payment for grout overruns.
2. Provide systems and equipment to measure the grout quality, quantity, and pumping pressure during the grouting operations. The pressure gauge shall be capable of measuring pressures of at least 150 psi or twice the actual grout pressures required on the plans, whichever is greater
3. Micropiles shall be primarily grouted the same day the load transfer bond length is drilled.
4. The grouting equipment used shall produce a grout free of lumps and undispersed cement.
5. The Subcontractor shall have means and methods of measuring the grout quantity and pumping pressure during the grouting operations. The grout pump shall be equipped with a pressure gauge to monitor grout pressures.
6. Grout shall be placed within 1.5 hours of mixing. If this time period is exceeded, the grout batch shall be rejected and a new batch mixed. There shall be no payment for rejected grout.
7. Once commenced, grout placement for each micropile shall be carried through to completion at a rate and with a continuity that results in no cold joints. The grout should be kept in constant agitation prior to pumping.
8. The micropile shall be tremie filled from the lowest point of the drill hole and placement shall continue until uncontaminated grout flows from the top of the micropile. Following tremie filling, the grout placement should continue under pressure to the levels indicated on the plans.
9. The grout pressures and grout takes shall be controlled to prevent excessive heave or fracturing of rock formations. Pressure shall be maintained for a duration of time sufficient to ensure the rock socket is filled in the annulus around the permanent casing. Grout return at the surface on the micropile annulus shall not be required. The Subcontractor shall monitor grout

pressure and take during pressure grouting to verify the rock socket/anchor bond zone is adequately filled.

10. A minimum of 125% of the theoretical grout volume of the casing and the annulus of the bond zone shall be placed.

11. Grout within the micropiles shall be allowed to attain the minimum design strength prior to being loaded.

3.5 TESTING AND INSPECTION

A. Inspection of Micropile Installation

1. The Buyer will engage the services of an independent engineering construction materials and testing services firm (Inspector) to provide inspection and final engineering certification of the micropiles. The Inspector shall be responsible for monitoring the installation of all micropiles to ensure conformance with the project specifications and drawings and shall certify (by licensed New York Professional Engineer) that the micropiles have been installed to achieve the specified design load capacities.

2. The Inspector shall monitor and inspect the drilling and installation of each micropile to verify that suitable quality rock has been reached and that the required bond length into the rock, as shown on the Subcontractor's Design Shop Drawings, has been achieved.

3. The Inspector shall inspect each micropile installation to determine that the dimensional tolerances for hole size, plumbness and location, as stated in the specification, have been achieved.

4. The Inspector shall inspect each micropile installation to verify that the hole has been cleaned of loose material and is free of standing water or, if water is present, the proper grout placing procedures are carried out as per this specification.

B. Inspection of Micropile Reinforcing

1. The Inspector shall be responsible for the inspection of the micropile reinforcing and placement thereof.

2. The Inspector shall inspect the micropile reinforcing steel to verify that the number and size of vertical bars are as shown on the Subcontractor's Design Shop Drawings. The Inspector shall also inspect all reinforcement splices to verify conformance with the Subcontractor's Design Shop Drawings and manufacturer's requirements.

3. The Inspector shall insure accurate positioning of the reinforcement within the hole.

4. The Inspector shall inspect installed reinforcement to determine that it is positioned correctly in the hole and that any required adjustments to the length of the reinforcement have been accomplished in accordance with the Subcontractor's Design Shop Drawings.

C. Inspection and Testing of Micropile Grout

1. The Inspector shall be responsible for the inspection of the placement of the grout in the micropiles.
2. The Inspector shall determine grout consistency as measured by grout density per ASTM C 188 at a frequency of one test per micropile, conducted just prior to start of pile grouting.
3. Grout cylinders or grout cubes shall be taken daily during production piling. At least six (6) cylinder or cubes shall be taken for each batch tested for strength testing of duplicate samples at 7 and 28 days, and two (2) held in reserve for 56 day strengths, if required. Curing and testing shall be in accordance with ASTM C109 and C1107 for cylinder and cube strength testing, respectively.
4. The Inspector shall monitor the use and withdrawal of temporary tremie pipe, if required, to insure that the placed grout is not contaminated by soil or water and that no voids are created in the micropile as the tremie pipe is withdrawn.
5. Throughout the period of grout delivery and placement, samples for density testing and for making test cylinders or cubes in brass molds with brass cover plates will be taken at least once per day of uniaxial compression testing by the Inspector, as required to determine whether the grout, as delivered, meets the necessary quality requirements. The Subcontractor shall provide such access and assistance as these other personnel may require in obtaining their samples, and shall not place any grout rejected by them for any reason.

D. Pile Load Tests

1. The Subcontractor shall perform verification load tests in accordance with the following instructions:
   a) Pre-production verification load test shall be performed to verify the design capacity and establish the baseline parameters for construction of production piles. A minimum of one (1) compression and one (1) tensile verification load tests shall be performed on vertically installed sacrificial piles located near the test boring. The test piles shall be loaded to a minimum of 2.0 times the allowable design load in accordance with ASTM D1143 and ASTM D3689 "Quick Test" procedures.

b) The tension micropile shall be tested for creep at the total test load. The test load shall be maintained for a minimum period of 60 minutes. Creep shall be limited to 40 mils (0.04 inches) for the 1 to 10 minute (1 log cycle of time) hold period or 80 mils (0.08 inches) during 6 to 60 minute time frame per PTI (2004) standards. The maximum load applied to the load test micropile center bar shall not exceed 80 percent of the structural capacity of the micropile structural elements, to include steel yield and/or grout crushing. If necessary, the tendon steel shall be increased to accommodate the maximum test load. Alternatively, the design bond length may be adjusted to allow full testing of the anchor bond strength.

c) The complete installation process and equipment used during the pre-production test pile program should be used to install the production piles. Production micropile installation shall not be permitted to start until a satisfactory verification test has been completed and until the drill hole diameter, bond length and grout strength have been quantified and approved by the Engineer of Record.

d) The verification testing program shall meet the requirements as indicated in this package and shall include a list of the automated measuring and recording equipment to be utilized during construction. The requirements for grout testing included in this specification shall also be listed.

END OF SECTION 31 62 33

SECTION 31 63 19
SECANT PILE BULKHEAD AND BARRIER WALLS

PART 1 GENERAL

1.1 GENERAL INFORMATION

A. This section covers the work for constructing overlapping reinforced concrete piles to form a secant pile retaining wall and grouting the bedrock below the bottom of the secant pile, if directed by the Owner.

B. Construct secant pile wall in accordance with these Specifications, the details and dimensions shown in the plans, and the Contract Documents. Furnish all materials, equipment, labor, and services necessary to perform all the operations to complete the work. The work shall include, but not be limited to, mobilization, surveying, drilling, installing secant pile reinforcing, tremie concrete placement, rock coring, and pressure grouting at the appropriate locations.

C. Secant piles shall have a minimum diameter, top and bottom elevation and overlap as shown on the Drawings.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI):

- 301.0 Specifications for Structural Concrete.
- 306.1, Standard specification for Cold Weather Concreting.
- 336.1 Concrete Drilled Shafts.

2. American Association of State Highway and Transportation Officials (AASHTO):

a. M6, Fine Aggregate for Portland Cement Concrete.

b. M80, Coarse Aggregate for Portland Cement Concrete.

c. M85, Portland Cement.

d. Tl1, Materials Finer Than 75-pm (No. 200) Sieve in Mineral Aggregates by Washing.

e. T22, Compressive Strength of Cylindrical Concrete Specimens.

f. T23, Making and Curing Concrete Test Specimens in the Field.

g. T27, Sieve Analysis of Fine and Coarse Aggregates.

h. T84, Specific Gravity and Absorption of Fine Aggregates.

i. T85, Specific Gravity and Absorption of Coarse Aggregate.

j. T96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

k. T104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

l. Tl19, Slump of Hydraulic Cement Concrete.

m. Tl21, Mass per Cubic Meter (Cubic Foot), Yield, and Air Content (Gravimetric) of Concrete.

n. T152, Air Content of Freshly Mixed Concrete by the Pressure Method.

o. T196, Air Content of Freshly Mixed Concrete by Volumetric Method.

3. ASTM International (ASTM):

a. ASTM A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

b. A36, Standard Specification for Carbon Structural Steel.

c. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless , black steel pipe, seamless steel pipe, steel pipe

d. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

e. A276, Standard Specification for Stainless Steel Bars and Shapes.

f. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.

g. A572, High-Strength Low-Alloy Columbium Vanadium Structural Steel, Grade 50 ksi.

h. A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

i. A501, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

j. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

k. A706, Standard Specification for Low-Alloy Steel Deformed and Plan Bars for Concrete Reinforcement.

l. A992, Standard Specifications for Structural Steel

m. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.

n. C33, Standard Specification for Concrete Aggregates.

o. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

p. C2117, Standard Test Method for Materials Finer than 75-~m (No. 200) Sieve in Mineral Aggregates by Washing.

q. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

r. C138, Standard Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete.

s. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.

t. C173, Standard Test Method for Air Contents of Freshly Mixed Concrete by the Volumetric Method.

u. C231, Standard Test method for Air Content of Freshly Mixed concrete by the Pressure Method.

v. C617, Standard Practice for Capping Cylindrical Concrete Specimens.

w. C618, Standard specification for Fly Ash and Raw or Calcin3ed natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

x. C1064, Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

y. D1785, Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series).

z. D5882, Standard Test Method for Low Strain Integrity Testing of Piles.

aa. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

4. American Welding Society

a. AWS D1.1, Structural welding code - Steel

1.3 DEFINITIONS

A. Segmental Casing: Protective temporary welded steel plate casing usually of cylindrical shape, lowered into excavated secant pile to prevent collapse or cave-in of sidewalls and for purpose of excluding soil and water from excavation.

B. Design Position: The location of the centroid of the top of the pile at cutoff elevation (x, y, and z coordinates) as shown.

C. Deviation: Difference between actual as-constructed horizontal location of center of secant pile from required location.

D. Drilling Slurry: A mixture of water, mineral or polymer in suspension used with or without casing to stabilize excavated secant pile until casing has been installed or concrete has been placed

E. Plumbness: Difference in horizontal location of center of secant pile measured at top and at bottom.

1.4 SHOP DRAWINGS

A. Shop Drawings:

1. Product Data: Commercial materials including polymer slurry, Portland cement, admixtures, and fluidifiers.

2. Steel Reinforcement:

a. Show the steel beam, grout pile and fender embedments.

B. Information Submittals:

1. Installer Qualifications.

2. Secant Pile wall guide wall template plan.

3. Secant Pile wall drilling and installation plan.

4. Manufacturer's Certification of Compliance: Commercial products and mill certificates.

5. Certified Test Results: Concrete mix design, including certification of minimum 28-day compressive strength, and aggregates.

6. Mill Certificates: Reinforcement steel, spirals, pile anchorage steel, void form material, and other embedded items.

7. Details on Contractor's equipment, methods, sequence, and procedures to include:

a. Secant pile drilling and casing installation and removal.

b. Polymer slurry design, method to mix, circulation, and de-sanding.

c. Method of checking and proving the cleanliness of the secant pile bottom and soundness of foundation material prior to concreting.

d. Concrete tremie placement methods, systems, and materials for casting and curing, including methods during warm or cold weather.

e. Dewatering, storage and water/polymer mud disposal plan.

8. Daily Log and Record: A record of all secant piles installed shall be kept by the Contractor, and a copy of the record of the Work done each day shall be given to the Engineer within 24 hours. The record form shall be approved by the Engineer, before Secant pile wall works commence. Any comment by the Engineer shall be incorporated into the record form. All unexpected drilling or installation conditions shall be noted in the records. Two (2) bound sets of collated and certified (by the Contractor's licensed professional engineer in the State of New York) piling records of all secant piles shall be submitted by the Contractor to the Engineer after the completion of the secant pile wall and secant pile wall works.

C. Installation Plan:

1. Secant Pile Wall Installation Plan: The Contractor shall submit the Secant Pile Wall at the preconstruction conference or no later than ten (10) working days before beginning secant pile wall construction. The Contractor shall submit the Secant Pile Installation Plan to the Engineer for his review and approval under these Specifications, and they shall not start any secant pile construction until the Engineer approves the Secant Pile Wall Installation Plan. The submitted Secant Pile Wall Installation Plan shall include the following:

   a. Name and Experience Record of the Secant Pile Wall Superintendent or Foreman in Responsible Charge of the Secant Pile Operations. The superintendent and foreman shall have a minimum of five (5) years of relevant secant pile wall installation experience. The person in responsible charge of day to day secant pile operations shall be qualified and approved under requirement Article Qualifications. Final approval by the Engineer of the Superintendent or Foreman will be subject to his satisfactory performance in the field.

   b. Site Visit: The contractor shall acknowledge that the job site has been visited to verify the site conditions with regard to entrance, access, overhead lines, subsurface features, permitting, and collecting all information necessary to plan and execute the installation of the Secant Pile Wall.

   c. Plan to Protect Existing Structures: The Contractor shall outline the steps he will take during Secant Pile Wall installation to monitor and protect existing steel sheet pile, wall anchorages (e.g., existing river wall, tie rods and dead man structures), adjacent or nearby structures and utilities.

   d. Details of Environmental Control Procedures: Indicate plan to prevent loss of slurry or concrete into project areas or protected areas. All state

and federal environmental regulations shall be abided to during secant pile construction.

e. List of Proposed Equipment: Include details of proposed templates; number and sizes of cranes; number and sizes of casing, drills (include rotary torque, crowd force, and maximum drilling depth); diameter, length, and reach of soil and rock augers, bailing buckets, and roller bits; cleaning equipment (cleaning buckets, submergible pumps, or air-lift pumps); size of de-sanding equipment and slurry pumps; soil sampling equipment; length and diameter of tremie pipes or size of concrete pumps; diameter, size, length, and thickness of casings; and all relevant equipment necessary to complete the secant pile installation. The Engineer will make a preliminary review of the equipment, but will not opine on the contractor's equipment to do the work.

f. Surveys and layout: The contractor shall retain a licensed New York State survey to firm to layout the secant piles and measure the bottom of rock socket elevation and cut-off (top) elevation for each pile. A pile layout plan and as-built plan shall be submitted.

g. Details of Sequence of Secant Pile Wall Installation and Time for Construction Operations: Include a layout of the secant pile installation sequence and guide walls, including minimum time between the completion of one secant pile and the commencement of the next, and the sequential pattern of construction. Time for advancing casings, sealing casings into top of bedrock, excavation and/or drilling time, secant pile cleaning, concrete placement. The Contractor should consider the effect of construction operations of one secant pile onto the adjacent secant pile(s) and avoid construction conflicts that will affect the quality or integrity of the completed work. The Contractor shall plan and execute the installation of the Secant Pile Wall following the general construction sequence specified in the Drawings, but can offer alternative means and methods to construct the wall. In addition, the Contractor should coordinate with the Engineer and other Contractors to ensure that the all construction events indicated in the Drawing occurs in the established sequence without delay.

h. Proposed Secant Pile Wall Installation Method(s): Details of the proposed method of installation. The Contractor should describe the method to be followed to prevent compromising the integrity of the existing river wall at containing the existing soils. Method for monitoring verticality of the secant pile walls during excavation, and details of proposed corrective measures to be implemented for secant

piles out of tolerance. Details of the methods and means of preventing displacement of the casing and/or secant pile during installation.

i. Details of Slurry Operations: If the Contractor selects to install the Secant Pile wall including the use of slurry, details for the use of drilling slurry including mixing, circulation, de-sanding, testing and disposing of the slurry (if applicable). Include a discussion of the suitability of the proposed drilling slurry in relation to the anticipated subsurface conditions following proposed construction methods. Submit proposed laboratories for testing and documenting test results. The use of bentonite or clay drilling methods is acceptable with provisions for fluid storage and spill prevention into the Hudson River.

j. Alternative Construction Method: Details of an alternate construction method to be implemented, if unexpected construction difficulties causing delays, distress or movement of the existing walls, structures, unacceptable to the Engineer, are observed during construction.

k. Quality Control Plan for Synthetic (biodegradable) Polymer Slurry: A plan for quality control of synthetic drilling slurries, if their use is proposed. In the quality control plan, include property requirements, required tests and test methods to ensure the synthetic slurry performs as intended. Submit to the Engineer the name and current phone number of the slurry manufacturer's representative who will provide technical assistance during construction.

l. Methods to clean the secant pile excavation prior to reinforcement placement.

m. Details of Steel Reinforcement Placement during Construction: Include the means and methods to ensure steel beams centering and cover; steel beams integrity while lifted during placement (number of cranes and lift points).

n. Concrete Mix Design: Include the details of the concrete mixed design to be used during concrete pouring of the secant pile. This concrete mix must be obtained based on the materials to be used at the moment of the concrete pouring, since the concrete properties change with change in the aggregate source and mixed constituents. The required 28-day compressive strength of the concrete is shown on the Contract drawings.

o. Concrete Placement Plan: The purpose of the Concrete Placement Plan is to ensure that sufficient concrete is at the job, site or in transit to the job site so that the entire pour can be done continuously without delay or removal of the tremie pipe during the pour. Include location of the concrete plant, number of trucks, estimated delivery times, estimated

time between trucks, and number of trucks at the site before placement begins. Indicate the use of tremie or concrete pump, de-air lines, details of the seal to be used at the bottom end of the tremie or concrete pump line. Breakdown of concrete plants, trucks, or traffic problems shall be considered under this Concrete Placement Plan. Contractor shall be aware of batch, travel, and concrete placement times. Include an estimate of the concrete placement and over pouring time per secant pile. When applicable, detail excavation to grade and finishing of the secant pile walls.

p. Concrete Testing: Include the name of the proposed testing laboratory conducting the field testing for slump, air-entrainment, making cylinders, sample curing, and the testing frequency. The Engineer may accept or reject the Contractor's concrete testing operations, or he can make modifications to it to ensure conformity and proper implementation of the Specifications.

q. Casing Installation and Removal: Include the details and means by which the Contractor intends to advance and remove temporary casings during excavation and after concrete pouring and reinforcing steel placement. Methods of Disposal of Spoil Excavation, Waste Slurry, Waste Concrete, and

r. Secant Pile Cutoffs: Sufficient details shall be presented to the Engineer to evaluate the adequacy and compliance of the Contractor's methods of disposal with the Engineer's specifications, including all related environmental permits and local regulations.

s. Other Information: Requested on the plans or by the Engineer.

2. Approval of the Secant Pile Wall Installation Plan:

a. The Engineer will evaluate the Secant Pile Wall Installation Plan for general conformance with the requirements of the Contract Documents. Within ten working days after receipt of the Secant Pile Wall Installation Plan, the Engineer will notify the Contractor of the conceptual approval of the Plan, of additional information required, or changes. Any unclear and/or unacceptable part of the Installation Plan will require resubmission. The Contractor shall promptly resubmit the Plan and with the necessary changes or additional information for evaluation and review. The Engineer will provide a written notice of acceptance or rejection of Contractor's re-submittal within five (5) working days after its receipt. The approved Contractor's Secant Pile Wall Installation Plan will be subject to satisfactory performance in the field, and the Engineer will provide a final approval of the Plan after its satisfactory field performance.

b. Should assessment or reassessment of the Secant Pile Wall Installation Plan have been made and the Engineer has granted its approval, no changes to the Plan can be made without a written consent of the Engineer.

D. Grouting Work Plan

1. Submit the following information a minimum of 90 days prior to the beginning of secant pile installation.

a. Resumes describing the experience of the grouting specialist and the grouting supervisor.

b. Descriptions and working drawings of all grouting equipment that will be used, including grout hole drilling equipment, grout mix design, grout mixing equipment, pumps, and the proposed equipment layout.

c. Calibration certificates for pressure gauges and flow meters.

d. Provide a sample of the grout data reporting form.

E. Grouting Reports and Records

a. Maintain daily logs of drilling and grouting operations including grout pressures, volumes, and grout mix used, and submit logs to the Engineer on a weekly basis.

1.5 QUALIFICATIONS

A. Installer: Unless otherwise indicated, the minimum Contractor's experience shall consist of successful installation of at least ten (10) secant or tangent pile walls of similar or greater size, and in similar geotechnical conditions and installed within the past five (5) years. The Contractor shall provide documentation of their superintendent's qualifications, record experience, and prior project references demonstrating that he can handle unusual site conditions and equipment breakdowns. The secant pile Work shall be performed under the supervision of the Contractor's superintendent, who shall be fully knowledgeable and experienced in construction of secant piles of similar size and geotechnical conditions as those shown on the plans. In addition, the Contractor's superintendent performing the Work shall have at least five (5) years of experience installing similar size secant pile walls within the last ten (10) years.

1.6 SEQUENCING AND SCHEDULING

A. Complete permanent wall anchorage piles, grade beams, excavations, earthwork, and wall template installations along the east side of the sheet pile wall prior to commencing secant pile drilling.

B. If the excavated secant pile is drilled in the dry, the secant pile drilling, clean out, inspection, installation of reinforcing steel and concrete placement, shall be done in the same day. Do not leave secant pile drill holes open overnight without temporary casing and drilling fluid maintained at least five (5) feet above the known river or groundwater table. We require all wet-method built secant piles drill holes be left overnight to allow settlement of cuttings, proper clean-out of cuttings the next morning using clean-out tolls, air-lifts or other means to provide a clean hole with less than one (1) inches of cuttings, debris or loose material accumulated at the bottom of the secant piles.

PART 2 PRODUCTS

2.1 CONCRETE

A. See Section 03 30 00.10, Cast-In-Place Concrete for secant pile and concrete.

B. Concrete Strength: The minimum 28 day cylinder concrete compressive strength shall not be less than 4,000 psi.

2.2 SLURRY

A. Use drilling slurry conforming to one of the following:

1. Mineral Slurry:

a. Use mineral slurry conforming to the following requirements:

Property	**Test**	**Requirement**
Density (pcf or lb/ft^3)	Mud Density Balance API* 13B-1, Section 1	64 to 69 pcf (at slurry introduction) 64 to 75 pcf (before concrete pour)
Viscosity (seconds/quart)	Marsh Funnel and Cup API* 13B-1, Section 2.2	28 to 45
	Glass Electrode, pH Meter, or PH Paper	7 to 11
Sand Content (percent)	Sand API* 13B-1, Section 5	4.0% max

*American Petroleum Institute

b. Maintain slurry temperature at 68 degrees F or more during testing.

2. Synthetic Polymer Slurries:

a. Use synthetic biodegradable polymer slurries according to the manufacturer's recommendations, the Contractor's quality control plan and this specification.

Property	Test Requirement
Density (lb/ft^3)	Mud Density Balance 65 to 67 pcf API* 13B-1, Section 1
Viscosity (seconds/quart)	Marsh Funnel and Cup 50 minimum API* 13B-1, Section 2.2 Glass Electrode, pH Meter, 8 to 11 or PH Paper

*American Petroleum Institute

b. The following synthetic polymer slurries may be used:

Product	Manufacturer
Slurry Pro CDP	KB Technologies, Ltd., Suite 216, 735 Broad Street, Chattanooga, TN 37402
Super Mud	PDS Company, 8140 East Rosecrans Avenue, Paramount, CA 90723
Shore Pac GCV	CETCO, 1350 West Shure Drive, Arlington Heights, IL 60004

c. Other synthetic slurry products may be used if submitted in writing with the approval of the Engineer.

d. The sand content of synthetic slurry shall be less than 2.0 percent (API 13B-1, Section 5) prior to final cleaning and immediately prior to concrete placement.

2.3 REINFORCING STEEL

A. Structural wide flange beam and structural tube shapes meeting ASTM A572, Grade 50 ksi steel, as specified in the Drawings.

B. Inclinometer/Drill Sleeve Piping shall be nominal 6-inch-diameter ASTM A53, A500 or A501 steel with threaded or flush couple pipe couplers. The bottom of each pipe shall be set at the base of the rock socket shall have a drillable bottom cap.

2.4 TEMPORARY SURFACE CASING

A. Steel Casing: Casing shall have a flush exterior, jointed, circular, rigid, smooth, clean, and watertight. Provide to maintain sidewall stability and prevent caving, to exclude groundwater, and as otherwise may be required. Strength shall withstand both handling and drilling stresses and the pressure of both concrete and the surrounding earth and hydrostatic pressure. The outside diameter of casing shall not be less than the specified size of the secant pile secant pile.

2.5 GRANULAR FILL

A. Granular fill shall conform to requirements of NYSDOT Section 703-02, Size 1A Crushed Stone, Crushed Gravel, or Screened Gravel**.**

2.6 CEMENT

A. Cement shall conform to the requirements of ASTM C150 Type I/II.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall carry out the Works in accordance with their written Work Plans and their means and methods statement. This means and methods statement shall include length of temporary casing, grouting, or other methods to stop loss of drilling fluid or concrete or collapse of soil; details of the constituent materials of any drilling fluid used for stabilization; the method of inspection; details of the concrete design mix; concreting method; the minimum time between the completion of one secant piles and the commencement of the next; and the pattern of construction.

B. The secant pile walls which consist of overlapping structural concrete piles are constructed usually by high torque rotary drilling equipment. The secant pile wall is constructed in two stages. All secant piles constructed during Stage 1 are known as primary piles. These are spaced at the specified primary secant pile spacing (in the drawings). All piles constructed during Stage 2 are known as secondary piles. Centered tangent piles within Secant portion of the wall, and below the cut level will be reviewed on a case by case basis by Engineer. The minimum overlap of contiguous piles shall be no less than 3 inches from the top to the bottom of the rock socket. These are positioned between the primary piles and secant (i.e., overlap) with the primary piles above the bottom of the basement to form a water tight structure. Reinforced concrete guide walls, as shown in the Drawings, shall be used at the ground surface to ensure positional tolerance. Secondary piles may not be installed until both adjacent primary piles have been installed and the tie rod stubs have been installed between the core beams and the external wale.

C. The Contractor shall be responsible for the program and sequence of construction which is dependent on the rate of gain of concrete compressive strength of primary secant piles affects the time within which secondary secant piles can be formed. The concrete mix may include additives to control the rate of gain of strength, particularly the primary piles. Where the Contractor considers that alternative proposals for the concrete mix are required then evidence of trial mixes should be provided. At no time shall a secondary pile be installed before 48 hours of concreting the primary piles.

D. Unless otherwise described in the Specifications, reinforcement and concrete shall comply with the requirements herein. The Contractor shall ensure that damage does not occur to completed piles through his method of working. The

Contractor shall submit to the Engineer a secant pile wall installation plan. The proposed sequence and timing of secant pile installation shall be such that the installation works shall not cause any damage to adjacent piles. The pile installation shall not commence until approval of the Engineer has been obtained.

3.2 SURVEYING

A. Employ an experienced Licensed Surveyor in the State of New York who will set up the position of the secant piles as shown on the plans. The Contractor will be responsible for the accuracy of location and positioning of each secant pile. Any errors in setting out and any consequential loss to the Contractor or Subcontractor shall be corrected to the satisfaction of the Engineer, by the Contractor without any additional cost to the Owner.

B. Preserve the monuments set out by the surveyor. Should any monuments be displaced or lost, it must be replaced by a licensed surveyor to the approval of the Engineer. Upon completion of the secant piles, produce as-built drawings showing the positions of all secant piles as installed. The positions of the secant piles shall be verified by a licensed surveyor.

3.3 DRILLING EQUIPMENT

A. Equipment used for excavation, drilling, and cleaning operations shall have adequate capacity; including power, torque, and down thrust to excavate a hole to a depth equal to the maximum depth of the secant piles shown in the plans plus 15 feet, or plus 20 percent of the secant piles maximum depth, whichever is greater in dry or wet (under slurry) conditions. The Contractor shall anticipate and make available at the job site all equipment necessary and essential to penetrate soft and hard soils, excavating in sands under the water table, as well as, obstructions, during the construction of the secant piles. The rock socket diameter shall not be less than 95% of the requisite shaft diameter shown on the drawings to ensure overlapping secant pile in the soil above and in the rock below the soil/rock interface.

B. When applicable, or required by the Engineer, provide equipment that produces a stable slurry suspension, mechanical agitation, and a pipeline or other safe methods of transporting the slurry to the secant pile.

3.4 PROTECTION OF EXISTING STRUCTURES AND RIVER WALLS

A. All reasonable precautions shall be taken to prevent damage to existing structures and utilities (e.g., river walls, tie rods and dead man anchorages, etc..). These measures shall include but are not limited to subsidence control during drilling.

B. A written procedure shall be submitted to the Engineer for approval when the removal of existing structures entails the hand excavation or vacuum excavation

deeper than 3 feet below grade, or along the perimeter of the site next to the existing River Wall.

3.5 DEMOLITION OF EXISTING STRUCTURE

A. The installation of the secant pile wall may require cutting or shearing existing tie rods connecting the existing river wall to the dead man anchorage structures. Other than boulders or bedrock floaters, no other manmade structures are expected to cause obstruction during the installation of the secant pile walls. If unforeseen structures are encountered, a written procedure shall be submitted to the Engineer prior to their removal.

B. Care shall be exercised to reduce the amount of soil removed or disturbed during the removal of excavation and removal of obstructions to limit existing sheet pile and ground movements to the performance limits set for the project.

3.6 METHODS OF SECANT PILE INSTALLATION

A. General: The method used for secant pile installation shall be suitable for the intended purpose and materials encountered. The method of construction shall be selected by the Contractor to meet all established requirements and during excavation and secant pile wall construction activities.

3.7 CONSTRUCTION OF SECANT PILES

A. Template Guide Walls: The construction of reinforced concrete guide walls shall be the responsibility of the Contractor and shall take into account the actual size and ground conditions and the equipment to be used on site to ensure stability, alignment, overlap, control tolerances, and avoid undercutting as appropriate. The surveying and construction of guide walls for secant pile wall construction requires a high degree of accuracy because the cut crescent shape of the inside faces of the secant pile wall are critical for achieving the correct center to center secant pile spacing and overlap. Construct guide walls using cast-in-place reinforced concrete. The minimum dimensions of the guide wall are specified in the Drawings. Larger size guide walls may be required if the subsoil is loose or soft to prevent movement of the guide walls during construction.

B. Casings and Forms: Flush couple steel pipe casings are employed to protect the secant pile from contamination from sloughing or caving. Form is defined as a short and surficial casing. All casings shall be removed in a twisting or smooth manner from the secant pile excavations.

C. Excavation:

1. General:

a. Excavation required for the secant piles shall be advanced through whatever fill, native soil, boulders and bedrock shale materials

encountered, of the dimensions, and to the elevations shown in the Contract Documents, the plans, or as directed by the Engineer. The excavation and installation method shall be suitable for the intended results and materials encountered.

b. The Contractor shall maintain a construction installation log during the secant pile excavation. The construction log will include information such as ground elevation, groundwater elevation, sequence number, method of installation, machines and tools employed, drilling fluids employed, drilling times, viscosity and sand content of the slurry, if any, during drilling and prior to concrete placement, excavated materials and their particular elevations, soil samples and their particular elevations, and any information relevant to the excavation process that will assist the Engineer in evaluating the foundation. Information shall also include methods for disposal of excavated material and slurry.

2. Manage excavated materials in accordance with the Section 02 61 00 – Removal and Disposal of Contaminated Materials. Excavated material handling includes:

   a. Whenever possible, perform the excavation of impacted material as a direct- load operation.

   b. Transport and dispose of excavated soil designated by the CM/Engineer for off-site thermal disposal at a regulated, licensed, and National Grid-approved thermal desorption facility.

   c. Transport and dispose of excavated soil designated by the CM/Engineer for off-site landfill disposal at a regulated, licensed, and National Grid-approved landfill facility.

   d. Segregate bulk solid waste and construction debris encountered during excavation from excavated soil to allow for acceptable disposal of soil at the thermal disposal facility, landfill, or material reuse on site, as provided by the CM/Engineer.

3. Overburden Secant Pile Excavation: The Contractor shall provide the necessary equipment to remove and dispose any materials encountered in forming the secant pile excavation to the dimension and elevation under the Contract Documents, as shown on the plans, or as directed by the Engineer.

4. Rock Secant Pile Excavation: The contractor shall remove rock by rock augers, down-the hole air driven hammers or over-coring and splitting to remove the request rock and not damage concrete in the left-in-place primary drilled and concrete wall element. Minimum rock socket

diameters are 42 inches for the 1180mm piles and 31 inches for the 880mm piles.

5. Drilling Slurry: If mineral or synthetic drilling slurry is selected, provide a manufacturer's representative or "mud engineer" to provide technical assistance at the site prior to use of the slurry, who shall remain at the site during construction and completion of a minimum of one secant pile to adjust the slurry mix for the specific site subsurface conditions. All in-hole drilling slurry shall meet the required specifications prior to concrete placement. Clean, re-circulate, de-sand or replace the slurry to maintain the required slurry properties. Maintain the level of slurry in the excavation at not less than 5 feet above the groundwater level for mineral slurries or 10 feet above the groundwater level for synthetic slurries. Maintain the slurry level a sufficient distance above all unstable zones to prevent bottom heave, caving or sloughing of ground from outside the limits of the pile. Feed slurry continuously into the secant pile excavation as drilling progresses so that a stable excavation is maintained. Use a self-priming pump to reclaim the slurry. Keep a standby pump available during the drilling operation.

6. Drilling Slurry Inspection and Testing: Mix and thoroughly hydrate all drilling slurries in an appropriate storage facility. Collect sample sets from the storage facility and perform tests to ensure the slurry conforms to the specified material properties before introduction into the secant pile excavation. A sample set shall be composed of samples taken at mid-depth and within 2 feet of the bottom of the storage facility. Sample and test all slurry in the presence of the Engineer, unless otherwise directed. The sample sets of slurry within the excavation shall consist of samples taken at mid-depth of the excavation and within 2 feet of the bottom of the excavation. Collect and test sample sets during the drilling operation as necessary to ensure the specified properties of the slurry are maintained. Clean, re-circulate, de-sand, or replace the slurry as necessary to maintain the specified slurry properties. Final cleaning of the excavation and placement of concrete will not be allowed until the test results indicate the slurry properties are as specified. Perform a minimum of two sets of slurry tests per eight hour work shift, the first test being done at the beginning of the shift. Field conditions may require more frequent testing to ensure acceptable slurry properties. Make copies of all slurry test results available to the Engineer on request. Immediate notification to the Engineer is required before the drilling if drilling procedures deviate from the conventional approved methods.

7. Obstructions: The Contractor shall remove or core through surface and subsurface obstructions at secant pile locations after approval by the Engineer. Occasional obstructions may include man-made materials, such

as old concrete blocks or natural materials such as boulders. Boulders are defined as stones greater than 12 inches. Special tools and/or procedures shall be used when the Contractor cannot advance the hole more than one foot in thirty minutes in overburden above the top of shale bedrock using conventional rock augers fitted with teeth, drilling buckets, or under reaming tools operating at maximum power, torque, and down thrust. Special procedures/tools may be required but are not limited to chisels, boulder breakers, core barrels, air hammer tools, and hand excavation. Other methods for obstruction removal such as temporary casing or hole diameter increase can be employed to aid in the removal.

8. Lost Tools: Drilling tools that are lost in the excavation shall not be considered obstructions and shall be promptly removed. All costs due to removal of lost tools shall be borne by the Contractor, including costs associated with hole degradation during removal operations or time while the hole remains open.

9. Cleanliness of the Excavation:

   a. The Contractor is to provide the details of secant pile cleanliness within the Secant Pile Installation Plan. The Contractor shall provide equipment and tools for checking the dimensions and alignment of each secant pile excavation, and he shall coordinate schedules for inspection of the excavation with the Engineer. The Contractor shall determine dimensions, alignment, and final depth of the secant piles after final cleaning.

   b. The cleanliness of the secant pile walls will be evaluated and approved by the Engineer immediately before concrete pouring. The Contractor must allow, after final cleaning and prior to concrete pouring, no more than 2 inches thick of deposits at the base of the excavation. Loose debris is defined here as settled solids from drilling slurry that is pushed outward to the perimeter of the secant pile base during concrete pouring.

10. Safety: The Contractor shall not permit any worker to enter the secant pile shafts for any reason unless; a suitable casing has been installed, the water level has been lowered and stabilized below the level to be occupied, and an adequate safety equipment and procedures have been provided to the personnel entering the excavation, which includes OSHA certification and permit for hazardous confined-space-entry, and written approval by National Grid.

11. Record Information: The Contractor must report to the Engineer the secant pile excavation records as indicate in the "Secant Pile Inspection Form" provided by the Engineer. Submit a draft of this form for each completed

secant pile within 24 hours of secant pile completion, and submit the final form within two weeks. Submit relevant information on a daily basis, or more frequently when variation occurs or as otherwise required by the Engineer.

D. Reinforcing Beam Placement:

1. Prior to placement of the reinforcing beam, grout pipes and inclinometer sleeves (if needed) and concrete and before construction can proceed beyond this point, secant piles and beams shall be within the tolerances as required in Article Tolerance.

2. Inclinometer sleeves (if needed) shall be tack welded to the reinforcing beam at 10-foot intervals starting at the top of the reinforcing beam and at the bottom.

3. Centralizers shall be used to ensure beam verticality.

4. If slurry fluid was employed during the installation of the secant pile, test the slurry for compliance with Subparagraph Drilling Slurry Inspection and Testing. Tests of the slurry shall be done along the pile and minimum twice at the bottom of the pile. Correct the slurry as necessary to meet these Specifications.

5. Drilling sleeves shall be installed plumb and should have a means to prevent flotation during concrete placement. Terminate sleeves at the bottom of the rock socket and extend sleeves to the ground surface.

6. When concrete is placed by tremie method, temporary hold-down devices shall be used to prevent uplifting of the steel beams during concrete placement.

E. Concrete Placement:

1. General: Once the Engineer has approved a concrete mixed design, the concrete delivered to the job site shall be tested for compliance with the approved concrete mix and these specifications before its placement begins.

2. Concrete Mix Design:

a. Concrete must maintain its workability throughout the pouring until concrete placement is completed. The trial mixed design for secant pile concrete shall include a Slump Loss Graph (or Slump versus Time after Batching). The Slump Loss Graph for a proposed secant pile-mixed design shall illustrate the slump reducing slowly and still exceeding 5 inch of slump, 4 hours after batching. Careful attention to concrete mix designs made with retarders must be exercised, and a close monitoring shall be implemented during construction to preclude

rapid slump loss, not given enough time for concreting completion before the concrete mixed sets.

b. Adding water to a ready-mix truck is prohibited, except in cases in which part of the water of the concrete mix is added at the batch plant and the remaining water is added at the job site. Then the amount of water to be added at the job site shall be stated on the mixed design sheet carried by the ready-mix truck driver. Testing of concrete will then be conducted on the resulting mix, and further water cannot be added at any time to increase the mixed slump or to bring the mix to a specific slump.

c. If after all the water permitted in the mixed design has been added and the slump is still out of these specifications, the Contractor must reject the mix. The Contractor shall repair or replace secant piles of questionable concrete design mixes at his expense.

3. Concrete Testing: The Contractor shall be responsible for requesting and controlling the quality of concrete received from the plants plus for meeting all the concrete requirements of these specifications. The minimum tests required at the job site by these specifications for freshly mixed concrete shall include measurement of:

   a. Concrete temperature.

   b. Air entrained.

   c. Slump of each truck delivered to the job site.

   d. Minimum frequency of concrete recovery for cylinder samples for later strength testing must be one sample from each ready-mix truck. A minimum of 6 cylinders shall be taken for each samples and tested at two tested at 3 or 7 days, two tested at 28 days, and two held in reserve.

   e. Slump and concrete for cylinder samples shall be taken at the discharge point for pumped concrete.

   f. All cylinders must be cured, capped, and tested in accordance with ASTM C31, ASTM C617, and ASTM C39, respectively.

4. Concrete Placement:

   a. General:

      1. Once the Engineer has approved a concrete mix design, the concrete delivered to the job site shall be tested for compliance with the approved concrete mix.

      2. Concrete placing rate shall not be less than 5 cubic yards per hour.

3. The minimum size tremie pipes shall be 5 inches for pumped concrete and 10 inches for gravity feed tremie concrete pours.

4. Where temporary casings are used as a method of construction, removal of the temporary casings can begin as indicated in these Specifications. Extract the casing at a slow twisting and/or uniform rate pull-in-line parallel with the secant pile axis. The Contractor is only permitted to exert rotation and pulling forces to the casing vertically and simultaneously. Extract the casing only while the concrete inside the secant pile remains still fluid.

5. Alternatively, and when conditions warrant, the Contractor may withdraw the casing in partial stages. However, he must always maintain a positive head of concrete inside the casing by embedding the tip of the casing into at least 10 feet of already poured fluid concrete. The Contractor must also keep sufficient concrete pressure head inside the tremie pipe or pump line to overcome the outside hydrostatic pressure of the drilling fluid.

6. For more than one casing or telescoping casings and when artesian conditions are encountered in the excavation, the Contractor must maintain a positive watertight seal between the interior and exterior casings throughout excavation and concreting operations.

7. If the top of the secant pile is above the ground, the uncovered secant pile shall be formed with a removable form or a permanent form when specified.

b. Concrete Placement by Concrete Pumps: Concrete pumps and steel pipe concrete lines can he used to pour concrete in secant piles rapidly. Concrete pumps are used to place concrete in secant pile excavations filled with water or slurry, to pour large or deep secant piles, or to deliver the concrete from a distant location. Workability of concrete shall not only be based on pumping requirements, but also in its fluidity to move freely through the reinforcing steel and exert lateral pressures on the excavation walls, and effectively scouring away the slurry built up on the walls. All pump lines and connections shall be watertight and must guide the concrete to the discharge point at the center of the secant pile excavation. The pump line can be flexible; however, its portion at the end of the line and inside the excavation must be made of rigid and heavy steel. Concreting shall continue until over pouring is evident at the top of the secant pile and until dark gray concrete (good concrete) can be distinguished from the drilling fluid.

5. The Contractor shall be responsible for the repair of any cracks, joint, defect of secant pile joints and pile section where on exposure of the wall

visible running water leaks are found which would result in leakage of the walls and difficulties in casting the liner. Exterior or interior grouting at no cost to the Owner shall be required to seal leaks between the secant piles or contiguous secant piles. Moist areas along the secant interface are acceptable with not seeping or running water.

6. The cost to remove and replace soil inclusions with structural concrete in all exposed basement areas shall be done at no cost to the owner.

F. Granular Fill Placement

1. Place granular fill between the specified top of concrete elevation and the proposed subgrade (soil cap or pavement).

2. Place granular fill using methods to prevent segregation and bridging. The use of temporary casing or polymer drilling fluid will be permitted to provide temporary support during granular fill placement.

3.8 BEDROCK GROUTING

A. Bedrock grouting will only be performed when and where authorized in writing by the Owner or Engineer.

B. The use of rotary or percussive drilling equipment will be permitted to advance the drill string through any obstructions in the drill sleeve. Stop rotary or percussive drilling within one foot of the bottom of the secant pile.

C. HQ-size, double tube, diamond coring is required to advance a 2-foot-long grout hole from the concrete/rock interface at the bottom of the secant pile and into the shale bedrock. Retain the core for visual evaluation by the Engineer.

D. Flush the grout hole with water before pressure grouting.

E. Pressure grout the grout hole with neat cement grout with a 1:1 w/c ratio. Apply a maximum pressure of 1 psi per foot of depth, as measured to the top of the packer.

F. Grout the hole under pressure until refusal. Maintain pressure on the grout until the grout has reached initial set.

G. Record the grout time, pressure, grout mix, and volume used for each hole.

H. Extract drill string and tremie grout the remainder of the drill sleeve.

I. Cutoff drill sleeve at the cap subgrade elevation.

3.9 TOLERANCES

A. The Contractor shall comply with the following construction tolerances:

1. Position: At cut-off level, the maximum permitted deviation of the secant pile center from the center point shown on the drawings shall be 1-inch in any direction.

2. The reinforcing beam shall be centered within 1-inch in any direction, and the beam shall be with five (5.0) degrees of the required major axis alignment.

3. Secant pile overlap shall be a minimum of 3 inches from the top to the bottom of the rock socket. All tangent piles shall touch and require full length exterior grouting to seal cold joints if the joints are above the excavation level.

4. Verticality: The vertical alignment of the secant pile excavation shall not vary from the alignment of the secant pile on the plans by more than 1/16 inch per foot of depth or 0.4% whichever is less.

B. Correction: If the secant pile was installed outside these tolerances affecting the design and appearance of the wall, the Contractor shall develop and carry out immediate remedial measure subject to the approval of the Engineer at no additional cost to the Owner.

3.10 WASTE DISPOSAL

A. Remove auger cuttings, spoil, polymer slurry and bentonite slurry from site and dispose of offsite in conformance with local requirements.

3.11 CONFIRMATION TESTING PROGRAM

A. Pile Test: Questionable pile exhibiting difficulties during installation will be full length cored with H-size, double tube, diamond coring to detect the presence and location of potentially dangerous defects such as cracks, necking, soil inclusions or voids. The Engineer will evaluate and analyze the results from the concrete coring logs within five (5) working days of their receipt and provide the Contractor with a response regarding the acceptability of the secant piles tested. The Contractor will be responsible to fully core, grout the core holes, and replace or repair the secant piles at no cost to the Owner.

3.12 ACCEPTANCE FOR CONSTRUCTED SECANT PILES

A. Based on Specifications: The Engineer will only accept secant piles provided the Specifications for Construction of Secant Piles are met. Secant Pile (s) and related work constructed disregarding any Engineer specification will not be accepted on the following basis:

B. Secant pile excavations constructed out of tolerance. When repair to an out-of-tolerance secant pile is possible as determined by the Engineer, the Contractor shall fix the secant pile to meet Engineer tolerances before he will be permitted to proceed further with any secant pile construction, and all repairs must be accepted by the Engineer before the Contractor can resume any secant pile work. Secant piles in which the Contractor's proposed Installation Plan for Secant Pile Construction fails to comply with these Specifications. Secant piles concreted using a different slump from that authorized or required by these

Specifications shall be subject to coring and special testing at no cost to the Owner. Secant piles with cold joints, segregated or contaminate concrete, honeycomb intrusions, and trapping of slurry mud or soil shall be repaired using written procedures developed by the Contractor and reviewed by the engineer. Horizontal discontinuity or severe necking in the secant pile concrete is not acceptable. When an excavation is done under slurry or water, sand lenses produced within concrete by a tremie or pump line pulled completely out of the concrete during concreting operations, allowing sand sedimentation lenses over the concrete surface will be cause for rejection and replacement at no cost to the Owner. Quarter-moon-shaped soil intrusions on the sides of a secant pile created by interruption of the concrete flow from a tremie or pump line will be cause for rejection and replacement at no cost to the Owner.

C. Rejection of secant piles based on full length concrete coring shall be conclusive in terms of an evident defect in the secant pile that will result in unsafe or inadequate performance of the same under service loads. The acceptance of secant piles shall be a decision of the Engineer based on the results of the full length concrete coring, remediation and confirmation testing show adequacy of the repair to the secant pile installation. In the case where a secant pile is determined to be unacceptable, the Contractor shall submit a plan for remedial action to the Engineer for his approval. Any modifications to the secant pile foundation, load transfer mechanisms, and elements affected by the remedial actions that will require calculations and working drawings shall be made and stamped by a professional engineer, registered in the State of New York. All labor and materials required to perform these remedial actions shall be provided at no additional cost to the Owner and with no extension of the contract time originally granted.

END OF SECTION 31 63 19

SECTION 32 31 00
CHAIN-LINK FENCES AND GATES

PART 1 GENERAL

1.1 SUMMARY

A. This Specification includes performing all Work required to furnish and install permanent replacement chain-link fences and gates in the locations shown on the Drawings.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. A 116 – Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
2. A 702 – Standard Specification for Steel Fence Posts and Assemblies, Hot Wrought
3. F 626 – Standard Specification for Fence Fittings
4. A 90/A 90 M – Standard Test Method for Weight (MASS) of Coatings on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
5. F 1083 – Standard Specification for Pipe, Steel, Hot-Dipping Zinc-Coated (Galvanized) Welded, for Fence Structures
6. A 153/A 153 M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
7. F 1043 – Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework
8. A 121 – Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
9. C 94/C 94 M – Standard Specification for Ready-Mixed Concrete

1.3 SUBMITTALS

A. Submit to the Engineer, shop drawings for the erection and installation of the chain link fence and gates which shall include, but are not limited to, the following items:

1. Fence assembly,
2. Location of corner, end, and line posts

B. Submit manufacturer's catalog data to the CM/Engineer for the following items:

1. Fence assembly,

2. Fence hardware and accessories

1.4 DELIVERY STORAGE AND HANDLING

A. Deliver materials to the Site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.5 QUALITY ASSURANCE

A. Submit reports from the manufacturer indicating the following:

1. Weight in ounces for the zinc coating.

B. The manufacturers catalog data may satisfy the requirements of the quality assurance submittal if, as determined by the CM/Engineer, the information provided therein is sufficient to establish if the material meets the requirements of the Specification.

C. Manufacturer's Qualifications:

1. The manufacturer of the fencing and gates of the type specified or similar product shall have at least five years experience in the manufacture of such materials.

D. Installer's Qualifications:

1. The fencing and gate installer shall be the manufacturer, approved manufacturer's installer, or a Subcontractor approved by the CM/Engineer to install the fencing and gates.

PART 2 MATERIALS

2.1. GENERAL

A. Provide fencing materials that conform to the requirements of ASTM A 116, ASTM A 702, ASTM F 626, and as specified.

2.2. ZINC COATING

A. Provide hot-dip galvanized (after fabrication) ferrous-metal components and accessories, except as otherwise specified.

B. Provide zinc coating of weight as detailed in this Specification, as determined from the average result of two specimens when testing in accordance with ASTM A90/A90M.

C. Provide zinc coating that conforms to the requirements of the following:

1. Pipe: ASTM F1083.

2. Hardware and accessories: ASTM A 153/A 153M, Table 1

3. Surface: ASTM F 1043

D. Provide galvanized repair material that is cold-applied zinc-rich coating conforming to ASTM A 780/A 780M.

2.3. FABRIC

A. Provide fabric consisting of No. 6 gage wires woven into a 2 inch diamond mesh, with a Class 2 weight of zinc coating. The weight of zinc coating shall not be less than 2.0 ounces per square foot of uncoated wire surface.

B. Provide one piece fabric widths for the fence height shown on the Drawings.

2.4. TOP AND BOTTOM SELVAGES

A. Provide twisted and barbed top selvage and knuckled bottom selvage.

2.5. LINE POSTS

A. Provide Type 1 round posts with a nominal outside diameter of 2.375 inches, a weight of 3.65 pounds per linear foot, and a minimum average zinc coating of 1.8 ounces per square foot.

2.6. END AND CORNER POSTS

A. Provide Type 1 round posts with a nominal outside diameter of 2.875 inches, a weight of 5.79 pounds per linear foot, and a minimum average zinc coating of 1.8 ounces per square foot.

2.7. TOP RAIL

A. Provide a round top rail with a nominal outside diameter of 1.66 inches, a weight of 2.27 pounds per square foot, and a minimum average zinc coating of 1.8 ounces per square foot.

B. Fit top rails with couplings for connecting the lengths into a continuous run. The couple may not be less than 6 inches long with 0.070 inches minimum wall thickness, and shall allow for expansion and contraction of the rail.

C. Provide suitable wire ties in sufficient number for attaching the fabric securely to the rail at intervals not exceeding 24 inches.

D. Provide the means to attach the top rail to each corner, and line post.

2.8. WIRE TIES

A. Provide 16-gage galvanized steel wire for tying fabric to line posts at intervals not exceeding 12 inches. For tying fabric to rails and braces, space wire ties 24 inches on center.

2.9. POST TOPS

A. Provide galvanized steel combination tops fit over the outside of the posts and exclude moisture from the entering the inside of the posts.

B. Provide caps with an opening to permit through passage of the top rail.

2.10. CONCRETE

A. Provide concrete conforming to ASTM C 94/C 94M, and obtaining a minimum 28 day compressive strength of 3,000 psi.

2.11. GROUT

A. Provide grout of proportions one part Portland cement to three parts clean, well graded sand and a minimum amount of water to produce a workable mix.

PART 3 EXECUTION

3.1. GENERAL

A. Verify the absence of defects or errors in the subgrade or other applicable Site features which would cause defective erection, installation, or application of products, or cause latent defects in workmanship and function.

B. Comply with manufacturer's written instructions, specifications, and recommendations for the erection and installation of the chain link fences and gates.

3.2. EXCAVATION

A. Provide excavation for post footings which shall be drilled holes in virgin or compacted soil.

B. Space footings for line posts at a maximum interval of 10 feet on center, and at closer intervals where required.

C. Set the bottom of each post not less than 36 inches below finished grade with the bottom of the hole at least 3 inches below the bottom of the posts. The diameter of borehole shall be a minimum of 4 times the largest cross section of the post that is being set. Set posts deeper, as required, in soft and problem soils or to support heavy lateral loads.

D. When solid rock is encountered near the surface, drill into the rock at least 12 inches for line posts and at least 18 inches for end, corner, and gate posts. Drill holes at least 1 inch greater in diameter than the largest dimension of the placed post.

3.3. SETTING POSTS

A. Remove loose and foreign materials from the boreholes and moisten the soil prior to placing concrete.

B. Set sleeves in a vertical position, plumb and align while concrete is backfilled

C. Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts.

D. Keep exposed concrete moist for at least 7 calendar days after placement, or cured with a membrane curing material.

E. Set poles into sleeves in a vertical position, plumb and align while backfilled with grout.

3.4. CONCRETE STRENGTH

A. Allow concrete to attain at least 75% of its minimum 28 day compressive strength, but in no case sooner than 7 calendar days after placement, before rails, wire, or fabric are installed.

B. Do not stretch fabric and wires until the concrete has attained its full design strength.

3.5. TOP RAILS

A. Install top rails to run continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer.

3.6. FABRIC INSTALLATION

A. Install fabric in single lengths between posts with bottom barbs placed approximately 1.0 to 1.5 inches above the ground.

B. Install fabric on the security side of the fence.

C. Pull fabric taunt and tie to posts and rails with wire ties.

D. Ensure fabric remains under tension after the pulling force is released.

3.7. WIRE TIE INSTALLATION

A. Install tie wires that are “U” shaped to the pipe diameters to which attached. Twist ends of tie wires not less than two full turns and bend so as not to present a hazard.

3.8. ZINC COATING REPAIR

A. Clean and repair galvanized surfaces damaged by welding, abrasion, peening, and cut ends of fabric, or other cut sections with specified galvanized repair material applied in strict conformance with the manufacturer’s printed instructions.

3.9. TOLERANCES

A. Provide posts that are straight and plumb within a vertical tolerance of 0.25 inch after the fabric has been stretched. Provide fencing and gates that are true to line with no more than 0.5 inch deviation from the established centerline between line posts.

B. Repair defects as directed by the Engineer.

3.10. CLEANUP

A. Remove waste fencing and gate materials from the Site.

B. Dispose of soil cuttings from drilling as detailed in Specification 02 61 00 – Removal and Disposal of Contaminated Materials.

END OF SECTION 32 31 00

SECTION 32 90 13
SEEDING

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, materials, and performing all operations required for establishing a satisfactory stand of grass in the locations shown on the Contract Drawings.

1.2. QUALITY CONTROL

A. Perform seeding and planting in accordance with standard local practice and all applicable regulations for the Town of Fort Edward.

1.3. DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis (% pure seed, % germination, date tested, etc.) and name of manufacturer.

B. Protect materials from deterioration during delivery, and while stored on the Site.

1.4. SUBMITTALS

A. Submit recommended fertilizer and seed and application rates with source of recommendation.

1.5. PROJECT CONDITIONS

A. Perform seedbed preparation and seeding as soon as possible after completion of remediation, backfilling, and grading.

B. Proceed with planting only when existing and forecasted weather conditions permit.

PART 2 MATERIALS

2.1. WATER

A. Use clean, fresh water that is free of substances which might inhibit the vigorous growth of grass.

2.2. SEED

A. Seed mixes for permanent vegetation shall be a blend of Red Fescue, Rye, and Kentucky Blue, applied at a rate of 75 lbs/acre, or equivalent, as determined by the Engineer/Construction Manager.

B. The variety and blends of seed may be added, deleted or substituted as appropriate to take advantage of proven varieties and mixtures and to account

for changes of season and weather. Submit proposed changes to the seed mixture to the Engineer/Construction Manager for approval prior to use.

C. Seed that has become wet, moldy or otherwise damaged will not be acceptable.

2.3. FERTILIZER

A. Use a fertilizer that is appropriate for the local soil type and climate.

2.4. LIME

A. Use a lime that is appropriate for the local soil type and climate.

2.5. TEMPORARY SEED (WINTER)

A. When planting seed outside the normal planting season use certified Aroostook winter rye (cereal rye).

2.6. MULCH

A. Use organic mulch that is free of weeds, mold, and other objectionable materials.

PART 3 EXECUTION

3.1. PLANTING RESTRICTIONS

A. Do not perform planting Work when the soil is frozen or otherwise in an unsatisfactory condition for working.

3.2. TEMPORARY RESTORATION

A. Apply temporary seeding to areas lacking vegetation, if no construction activities will be performed in the area for more than 30 days.

3.3. SEED

A. Scarify soil surface as needed prior to seeding. Apply fertilizer and lime as needed.

B. Apply seed using broadcasting or hydroseeding methods to result in good soil to seed contact. Apply seed from a minimum of two directions. Lightly roll the seed bed, as needed, to result in good soil to seed contact. Use equipment that is specifically designed to uniformly plant grass seed.

C. Apply seed at a rate of 75 lbs. per acre (2.5 lb/1000 sq. ft.).

D. Re-seed areas that do not germinate, as determined by the Engineer/Construction Manager.

E. Do not apply seed when weather conditions are unfavorable as determined by the Engineer/Construction Manager.

3.4. MULCH

A. Mulch seeded area to provide initial erosion controls while seed is germinating and establishing, and to aid in weed control.

B. Apply mulch immediately after seed has been applied, or simultaneously with the seed if hydroseeding equipment is used. Apply mulch at a uniform rate.

C. Anchor mulch to ground, as needed.

D. If necessary, provide an erosion mat that is consistent with Class I, Class II, and Class III Rolled Erosion Control Products in section §209-3.12 of the New York State Department of Transportation Standard Specification, January 7, 2010 letter.

E. Re-mulch areas where mulch fails to protect the seed bed, as determined by the CM/Engineer.

3.5. ESTABLISHMENT OF GRASS

A. Begin maintenance of seeded areas immediately after seed placement. Water; repair washed or eroded areas, and otherwise protect and maintain the seeded areas until a final satisfactory stand of grass is obtained.

B. The CM/Engineer will periodically inspect the seeded areas to verify that a satisfactory stand of grass is obtained in all areas seeded. Re-seed bare and eroded areas as directed by the CM/Engineer.

C. Mow the seeded areas twice, once a satisfactory stand of grass has been established. A satisfactory stand of grass is defined as a cover of living plants, after true leaves have formed, of the seed species applied, in which gaps larger than one square foot do not occur, and the total bare area is less than one percent of the total seeded area.

D. Warranty the plantings for 1-year days following the establishment of a satisfactory stand of grass.

END OF SECTION 32 90 13

SECTION 35 06 40
SCHEDULES FOR WATERWAY CONSTRUCTION

PART 1 GENERAL

1.1. SUMMARY

A. This specification contains the waterway construction schedule for the Work.

1.2. WORK RESTRICTIONS

A. The lock is in operation from May 1 to November 30. During this time, the navigation channel must remain unblocked, and be a minimum of 45 feet wide, as measured from the western guide wall.

B. Due to the presence of migration and/or breeding sturgeon, no in-water work may take place in the lock approach area or the Hudson River from March 1 to June 31. A variance from this restriction is possible, but for the purposes of bidding, assume that this restriction is applicable to this work.

1.3. SUBMITTALS

A. Incorporate a schedule into the Scheduling section of the Site Operations Plan (SOP) submittal described in Section 01 30 00 – Administrative Requirements that shows the expected start and completion date for each of the major tasks associated with the work.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 35 06 40

SECTION 35 12 13
MARINE SIGNALING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the installation, maintenance, repair, and removal of marine signaling equipment during performance of the Remedial Action.

1.2 SUBMITTALS

A. Incorporate the following into the Marine Signaling Equipment section of the Site Operations Plan (SOP) submittal described in Section 01 35 00 – Special Submittals:

1. Means and methods of installation, maintenance, operation, and removal of marine signaling equipment.

2. Manufacture's specification describing the proposed marine signaling equipment.

3. Shop drawings of the proposed locations of signaling equipment, including drawings showing how equipment location will change during each phase of the project.

4. Permits and approvals from the US Coast Guard regarding Private Aids to Navigation and other relevant permits.

B. As part of the Daily Progress Report described in Section 01 33 00 – Submittal procedures, submit a summary of the current condition of all signaling equipment, maintenance or repair activities performed or scheduled, and indicate any inadequate performance.

PART 2 PRODUCTS

2.1 GENERAL

A. Marine signaling equipment is to be commercially available, fully operational equipment designed for marine use.

1. Equipment includes anchors or lines required to maintain position and function.

2. Anchors, if applicable, must be of sufficient weight and strength to hold the equipment in position in normal conditions, including forces of ice, waves and tides, and ships' propeller wash and wake.

2.2 LIGHTS

A. Navigation warning lights shall conform to United States Coast Guard requirements for visibility and color.

B. Provide lighting on all floating vessels, including scows, barge and dredge equipment consistent with United States Coast Guard regulations for ships and barges and which is clearly visible from a distance of at least 100-feet.

C. Provide lighting for the Fixed Turbidity Curtain consistent with the requirements of the United States Coast Guard. At a minimum, provide lighting at intervals of 20 feet along the turbidity curtain and which is clearly visible from a distance of at least 100 feet.

2.3 BUOYS

A. Provide tide-adjusting construction warning buoys for the Fixed Turbidity Curtains consistent with the requirements of the United States Coast Guard. At a minimum, provide construction buoys at intervals of 20 feet along the turbidity curtain. Jim-Buoy Model #410x with tide adjustment system Model #300, and mooring Model # 4100 – 90, Jim-Buoy/Cal-June, Inc. North Hollywood, CA, or engineer-approved equivalent.

B. Provide construction marker buoys for the Fixed Turbidity Curtains consistent with the requirements of the United States Coast Guard. At a minimum, provide construction marker buoys at intervals of 20 feet along the turbidity curtain. Jim-Buoy Model #410x with tide adjustment system Model #300, and mooring Model # 4100 – 90, Jim-Buoy/Cal-June, Inc. North Hollywood, CA, or engineer-approved equivalent.

2.4 SIGNS

A. Provide “Warning - Construction Area – No Entry” and “No Wake” warning signs at intervals of 60 feet along the Fixed Turbidity Curtain, readable from a distance of 100 feet.

B. The following signs will have been provided by others under previous contract: Provide “Warning – Do Not Tie To Bulkhead or Shore” signs at intervals of 60 feet along the existing bulkhead, readable from a distance of 100 feet.

PART 3 EXECUTION

3.1 INSTALLATION AND OPERATION

A. Coordinate with the U.S. Coast Guard and USACE Lock No. 1 office and obtain all required permits/file all required notifications prior to mobilizing to the Site.

B. Furnish and maintain all marine signaling equipment required by U.S. Coast Guard regulations while the Work is being performed.

C. The marine signaling equipment must be provided during all on-water Work including, but not limited to the following Work:

1. Removal of the temporary berm, as described in Section 35 20 23 Dredging.
2. Installation of the new secant pile wall, if on-water work, as described in Section 31 63 19.
3. Removal of the existing sheet pile wall and sediment/soil behind the existing sheet pile wall, as described in Section 31 23 00 – Excavation and Fill.
4. Dredging of sediment, as described in Section 35 20 23 – Dredging.
5. Handling of dredged sediment as described in Section 35 20 24 – Dredged Sediment Handling.
6. Filling activities as described in Section 35 43 10 – Aquatic Filling and Capping.

D. Each night, between sunset and sunrise and during periods of restricted visibility, provide and energize lights for floating plants, Fixed Turbidity Curtain, and markers. Also, provide lights for buoys that could endanger or obstruct navigation.

3.2 INSTALLATION AND OPERATION

A. Inspect marine signaling equipment daily. The Contractor must immediately modify, adjust, or repair any faulty equipment or anchorage to correct inadequate performance. The marine signaling equipment must remain in place until the protected construction activities have been completed.

B. Maintenance includes re-positioning of the equipment if they become accidentally dislodged or are required to be re-positioned or re-installed due to the Contractor's operations.

3.3 REMOVAL

A. Remove the marine signaling equipment within 72 hours of completing the protected construction activities.

B. Decontaminate equipment and accessories in contact with contaminated sediment in accordance with Section 01 50 00 – Temporary Facilities and Controls

C. Contact the US Coast Guard and the USACE Lock No. 1 office at the completion of the marine Work and the removal of all marine signaling equipment.

END OF SECTION 35 12 13

SECTION 35 20 20
TURBIDITY CONTROLS AND ABSORBENT BOOMS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the installation, maintenance, and removal of all turbidity controls and absorbent booms required for completing the Work.

1.2. GENERAL REQUIREMENTS

A. The turbidity controls weight system must hold the bottom edge of the curtain in place vertically and allow for between 12 and 24 inches of clearance above the sediment surface at mean lower low water, so the curtain does not disturb sediment by repeatedly striking the bottom.

B. If constructed in panels, connect the panels to prevent suspended particles passing through the joints. Connect load lines so that the full strength of the load line is developed across the joint.

C. Provide a minimum of 4 inches of freeboard along the entire length of system, to prohibit the escape of turbid water via overtopping.

D. The CM will perform a water quality monitoring program as described in the Remedial Design Report and NYSDEC Water Quality Permit. Take immediate action to rectify any deficiencies noted by the CM in water quality during the performance of the Work.

1.3. SUBMITTALS

A. Submit the following information on the fixed turbidity screen and moveable dredging curtain systems for review and approval as part of the Site Operations Plan:

1. Manufacturer cut sheets and specifications.

2. Description of the means and methods of installation, anchoring, maintenance, operation, and removal.

3. Shop drawings of the proposed fixed and dredging turbidity controls that detail the materials and construction of the systems.

4. Permits or approvals from the US Coast Guard, and USACE, if applicable.

PART 2 PRODUCTS

2.1. TURBIDITY CONTROLS GENERAL REQUIREMENTS

A. Furnish turbidity controls that are commercially available, preassembled systems that include a geotextile, flotation system, reefing float, bottom weight, and

anchoring and securing mechanism. If assembled in panels, include a secure mechanism for joining panels together.

B. Use turbidity control materials that meet the following minimum requirements:

1. Hemmed pockets that are sewn or heat bonded to the curtain flotation material and bottom weights.
2. Flotation materials that maintain buoyancy if punctured or cut.
3. A bottom weight of sufficient size to hold the system in a vertical position.
4. Anchorage lines of sufficient strength and number to support the system and its components while maintaining its position under typical operating conditions that can be expected on the Hudson River, in the lock approach area.

2.2. FIXED TURBIDITY SCREEN

A. Furnish a permeable, fixed turbidity screen for placement around the Site perimeter, as shown in the Contract Drawings, during the performance of the Work.

B. The fixed turbidity screen consists of the turbidity screen, the attached absorbent boom, flotation, reefing float, and weight materials, and all ties, anchors, and lines required to maintain its position and function.

C. Furnish a turbidity screen capable of functioning during operating conditions that can be reasonably expected when performing work on the Hudson River (minimum U.S. Department of Transportation Type II or better).

2.3. ABSORBENT BOOM

A. Furnish unused, commercially available, oil absorbent booms with end-ties that enable a continuous length of boom to be deployed without gaps.

B. The absorbent boom must be capable of being attached to the inboard side (dredging side) of the turbidity controls without reducing the effectiveness of the turbidity control or the boom.

2.4. MOVEABLE DREDGING CURTAIN

A. Furnish an impermeable, moveable dredging curtain for placement around the active dredging area during the performance of the Work.

B. The moveable dredging curtain consists of the turbidity curtain, attached absorbent booms, turbidity curtain frame, flotation and weight materials, and all ties, anchors, and lines required to maintain its position and function.

C. Furnish a turbidity curtain capable of functioning during operating conditions that can be reasonably expected when performing work on the Hudson River.

2.5. MOVEABLE DREDGING CURTAIN FRAME

A. Furnish a moveable dredging curtain that can be relocated around the Site, as needed. Perform all dredging work within the confines of the moveable dredging curtain.

B. Furnish a rigid frame of sufficient strength to support and maintain the position of the moveable dredging curtain, absorbent boom, and all other components during the performance of the Work.

C. The maximum dimensions of the moveable dredging curtain are to be 40 feet by 40 feet in plan view, unless a request for an alternate shape is proposed by the Contractor and subsequently approved by the CM.

PART 3 EXECUTION

3.1. INSTALLATION

A. Install the fixed turbidity screen, as shown in the Contract Drawings, prior to performing any Work that may disturb sediments and/or create turbid water.

B. Place the turbidity screen in a furled condition. Do not allow the anchors to sink until the screen has been appropriately positioned.

C. Protect the existing adjacent infrastructure in the lock approach area from becoming damaged by the turbidity controls. Damage caused to existing features as a result of the turbidity controls must be repaired in a timely fashion at no additional cost to the Owner.

D. Tie the absorbent booms to the inboard side (dredging side) of the turbidity controls to form a continuous line of boom.

3.2. MAINTENANCE

A. Inspect the turbidity controls and absorbent booms daily. Perform additional inspections, as may be needed, during inclement weather or after accidental vessel strikes.

B. The following conditions constitute inadequate performance of the turbidity curtains and require immediate maintenance and/or corrective action:

1. Any visible plume of cloudy water, or sheen, passing beyond either the moveable or fixed turbidity controls.

2. Exceedance of the water quality criteria, as measured at the water quality monitoring stations located outside the fixed turbidity curtain, if determined by the CM to be caused by Work related activities.

C. Take immediate action to correct inadequate performance of the turbidity curtains.

D. Maintain the turbidity controls in place until the construction activities have been completed and the turbidity of the water enclosed is reduced to acceptable levels, as determined by the CM.

E. Remove the turbidity controls within 72 hours of receiving notification to do so from the CM.

F. Maintenance includes, but is not limited to, the re-positioning of the turbidity controls if they become accidentally dislodged, any re-positioning/re-installation needed because of the Contractor's operations, and performing any repairs, as directed by the CM.

3.3. REMOVAL

A. Minimize the disturbance of sediments when removing the turbidity controls. Do not drag the system, or anchor lines, on the sediment surface during removal.

END OF SECTION 35 20 20

SECTION 35 20 23
DREDGING

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for completing the mechanical dredging portion of the Work.

1.2. REFERENCE

A. Technical Guidelines for Environmental Dredging of Contaminated Sediments, Environmental Laboratory, U.S. Army Engineer Research and Development Center, Michael R. Palermo, Paul R. Schroeder, Trudy J. Estes, and Norman R. Francingues. (ERDC/EL TR-08-29, September 2008).

1.3. QUALIFICATIONS

A. The Contractor, or dredging Subcontractor, shall have completed at least 3 remedial dredging projects of similar size and scope using mechanical methods.

B. The Contractor's, or dredging Subcontractor's, dredging supervisor shall have a minimum of 5 years of experience with dredging projects in the role of dredging supervisor or superintendent.

C. The Contractor's, or dredging Subcontractor's, equipment operators, supervisory engineering staff, and technical staff shall have a minimum of 2 years of experience with dredging by via mechanical methods.

1.4. SUBMITTALS

A. Submit the following information as part of the Site Operations Plan submittal described in Section 01 31 00 – Administrative Requirements.

1. Description and specifications of the dredging system, including proposed buckets.

2. A sample of the output from the dredge management software that demonstrates how the daily dredge prism will be recorded.

3. A description of the methodology that will be used for minimizing the volume of free water dredged with the sediments and for minimizing the re-suspension of impacted materials.

4. Dredging procedures and sequence of the Work.

5. Estimated production rate.

6. Methods for handling, separating, and decontaminating debris (if encountered).

7. Equipment decontamination and waste management practices/procedures.

8. Methods for protecting adjacent structures.

1.5. DEBRIS

A. The Contractor may encounter bottom debris such as, but not limited to, cable, rope, netting, miscellaneous metal, tires, abandoned mooring buoys and blocks, abandoned pilings, fendering, cribbing and other wood debris, ballast and dumped gravel, rock, granite blocks, and cobbles.

B. Furnish any special or additional equipment that may be required for removing submerged obstructions and debris. Care must be taken when removing any debris encountered adjacent to existing structures to minimize any possible impact.

C. Separate floating debris contained within the fixed turbidity curtain and stockpile for off-Site disposal.

D. Minimize the practice of in-water washing/rinsing of debris to remove contaminated sediment.

E. Properly dispose of debris in accordance with all applicable laws and regulations.

1.6. UTILITIES

A. Prior to commencement of dredging, coordinate with the applicable utility companies to identify and mark the exact locations of any existing submerged utilities within the Site.

1.7. OVERDEPTH AND SIDE SLOPES

A. Dredging shall be to a depth of 6 feet or until bedrock, whichever is shallower.

B. Minimize over dredge dredging.

C. Payment will only be made on the computed volume of the dredge prism shown in the Contract Drawings plus a volume equivalent to 3 inches of allowable over-dredge, including side slopes.

D. Payment will not be made for any Work performed beyond the maximum dredge cut line shown in the Contract Drawings, including dredging and aquatic filling.

E. Do not exceed the dredge cut line of 1:3 at the side slopes.

1.8. PROTECTION OF EXISTING STRUCTURES:

A. Perform the dredging operation with due care and do not damage, undermine, weaken, or otherwise impair existing structures located near the dredge area.

B. Use fenders or other temporary structures to protect existing features.

1.9. FIELD MONITORING:

A. The CM will monitor the dredging operations for water quality compliance. Do not perform dredging Work if the CM is not on-Site, unless advanced approval has been granted.

B. Complete lead line checks of dredged areas on a regular basis. At a minimum, perform a lead line check before each dredge move. Maintain a log of all lead line checks, and make this log available to the CM upon request.

PART 2 PRODUCTS

2.1. DREDGING EQUIPMENT

A. Perform the Work using an environmental, level cut dredging bucket as manufactured by Cable Arm, Inc., or Engineer approved equivalent.

B. Furnish equipment of sufficient size and capacity to dredge sediments to the depths shown on the Contract Drawings.

C. Furnish an environmental, level cut dredging bucket for use during the performance of the Work.

2.2. DREDGING MANAGEMENT SYSTEM

A. Use a dredging management system to control the Work that has the following features:

1. Can be fully integrated with navigational equipment to support precise positioning of both the dredge barge and the excavator/crane bucket.
2. Is able to process real time data to display the dredging progress in real time.
3. Can generate daily dredge prisms for submission as part of the Daily Report.
4. Can provide the barge position on the X and Y axis with DGPS precision and provide the excavator or crane bucket position on the X and Y axis with an RTK precision.
5. Can provide the bucket depth (Z-axis) in real time with a level of precision of 0.1 feet and is capable of marking each bucket bite location along with the depth of each bite.
6. Ability to display both the existing and proposed dredge grades, adjusted for the real time tide level, as well as the cut thickness for a given bucket location.
7. The system must be able to accept and display real time tide data obtained from an electronic tide gauge.
8. Examples of acceptable software suites include Clamvision, Dredgepack and Winops.

PART 3 EXECUTION

3.1. DREDGING

A. Remove sediments, via mechanical dredging, to the lines, grades, and tolerances shown in the Contract Drawings.

B. Do not drag the bucket, beam, or other items across the dredge surface to meet design grades.

C. Slow the rate of ascent and descent of the dredge bucket to reduce potential sediment loss.

D. Close the dredge bucket completely before raising it to minimize sediment loss. Avoid overfilling the bucket; this may cause loss of material as it ascends through the water column.

E. If the bucket does not close completely because of a debris obstruction, do not drop the load at the surface to dislodge the debris; complete the dredge pass and deposit the debris on the stockpile pad.

F. Do not stockpile dredged materials on the sediment surface.

G. Maintain at all times the water quality criteria specified in the Water Quality Monitoring Plan of the Design Report for OU-1, GEI, December, 2013.

H. Use tow boats of an adequate size for towing the scows that have the necessary reserve power for maneuvering with scows under emergency conditions.

I. Perform the surveying Work required for documentation as detailed in Specification Section 02 21 00 – Surveying. Stop Work if the surveying controls malfunction or become obscured.

J. Provide a system of communication between the dredge crew, the towboat, the Contractor's personnel, and the CM. Portable 2-way marine radios are acceptable.

K. With the exception of protecting existing structures from imminent damage, do not backfill or cover any dredged areas without prior approval from the CM.

L. Provide a lined pen capable of storing dredge spoil and excess water. Prior to off-loading dredge spoil to the sediment stockpile pad, pump free standing water from the hopper or pen into the water treatment system. Do not allow dredge water to spill over the side of the hopper or pen and run back into the river.

END OF SECTION 35 20 23

SECTION 35 20 24
DREDGED SEDIMENT HANDLING

PART 1 GENERAL

1.1 SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the transfer of dredged sediment and temporary storage of dredged sediment during performance of the Work.

1.2 SUBMITTALS

A. Incorporate the following into the Dredged Sediment Handling section of the Site Operations Plan (SOP) submittal described in Section 01 30 00 – Administrative Requirements:

1. Identify sediment handling equipment.
2. Means and methods of temporary storage, transfer, and placement of dredged sediment.
3. Means and methods for minimizing water transport with placement of dredged sediment.
4. Means and methods for mitigating impacts to ambient air quality due to volatilization or off-gassing of contaminants from the dredged sediment.
5. Water quality protection measures.
6. Shop drawings of proposed sediment storage areas and transfer routes.
7. Manufacturer's specifications for environmental protection equipment and supplies.

B. As part of the Daily Progress Report, submit the following information: daily totals and running totals for the volume of sediment currently stored, volume of sediment placed, a sketch showing locations of interim sediment storage and daily placement areas.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 SEDIMENT HANDLING

A. Handle sediment in accordance with the sequence and limitations shown on the Drawings.

B. Handle sediment using a method that minimizes spillage, including splashing.

C. Keep solids and water separate during transfer. To promote settling, remove free water prior to placement to minimize the water content of the dredged sediment.

D. Free liquid removed from sediment transfer containers or vessels shall be managed as Remediation Waste in accordance with Section 02 61 00 – Removal and Disposal of Contaminated Materials.

E. Equipment and accessories in contact with dredged sediment shall be decontaminated in accordance with Section 02 61 00 – Removal and Disposal of Contaminated Materials.

END OF SECTION 35 20 24

SECTION 35 43 10
AQUATIC FILLING

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for completing the aquatic filling portion of the Work.

1.2. SUBMITTALS

A. Aquatic filling plan: Submit a plan showing the sequencing, staging, and phasing of the aquatic filling Work. Incorporate the aquatic filling plan into the Site Operations Plan submittal described in Section 01 31 00 – Administrative Requirements.

B. Borrow Source Evaluation: Submit the results of the borrow source evaluation for each source to be used as imported fill. Perform the borrow source evaluation, and obtain approval from the CM, prior to the import of fill from the borrow source. Include the following information:

1. Name, address, telephone number, facsimile number, and website address of borrow source.

2. Certificate of clean fill from the borrow location stating that the fill is native in origin and free of contamination. The fill shall also satisfy the NYSDEC Technical Guidance for Screening Contaminated Sediment, January, 1999.

3. Analytical results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is free of contamination and in compliance with the clean fill environmental criteria.

4. Geotechnical test results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is in compliance with the clean fill geotechnical criteria.

PART 2 PRODUCTS

2.1. BENTHIC SAND

A. Furnish benthic sand that is free of organic material and lumps or balls of clay that meets the following gradation requirements:

U.S Standard Sieve Size	Percent by Weight Passing
3/8 –inch	100
No. 200	0 to 5

1. Complete a grain size analysis via ASTM D6913-latest edition for each borrow source of benthic sand.

B. Environmental Analysis Requirements:

1. Analyze backfill samples for RCRA 8 Metals, PCBs by EPA Method 8082, VOCs by EPA Method 8260, and SVOCs by EPA Method 8270C at a laboratory that is appropriately licensed to perform the analysis in the State of New York. Forward analytical results to the CM at least two weeks prior to the material being imported to the Site.

2. The imported benthic sand fill shall satisfy the NYSDEC Technical Guidance for Screening Contaminated Sediment, January 1999, to meet the environmental analysis requirements for the Project.

PART 3 EXECUTION

3.1. INSTALLATION

A. Placement of fill materials may only proceed after all dredging is complete, as verified by the CM.

B. Place the fill materials to the horizontal and vertical limits as shown in the Drawings. Fill materials are to be placed in lifts not to exceed 1 foot in depth.

C. The top of fill elevations are to be a minimum of 2 feet above the final dredged elevations for each control point shown in the Contract Drawings.

D. Fill materials may consolidate the top of soft sediments causing a loss of elevation. Place additional fill material to compensate for any settlement.

E. If fill materials are present at elevations greater than +3.0 inches above the top of fill elevations shown in the Contract Drawings, then remove fill materials using decontaminated mechanical dredging equipment until the required tolerances have been achieved. The Contractor is responsible for the cost of the corrective removal and the disposal of fill materials associated with these requirements.

F. Place fill materials according to unit loading rates, means, methods, and sequencing as described in the Site Operations Plan (SOP).

G. Placement of materials should proceed from the farthest point off-shore or lowest elevation, in a direction up the slope in the direction of the shoreline.

H. Do not stockpile fill material on the bottom of the river.

I. Do not drag the bucket, beam, or other items across the dredge surface to meet design grades.

3.2. COMPLETION

A. The placement of fill materials will be considered complete when the final survey of horizontal and vertical extent of filling has been submitted to, and approved by, the Engineer.

END OF SECTION 35 43 10

SECTION 44 01 40
OPERATION AND MAINTENANCE OF WATER TREATMENT EQUIPMENT

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the treatment and discharge of contaminated water collected during dewatering, drilling, decontamination, and all other project operations.

B. Provide a water treatment system capable of treating water generated during the work, as described in Specification 31 23 19 – Dewatering, to the treatment standards required by the discharge permit. Use the treatment standards provided in the Example Wastewater Discharge Permit Equivalent attached to these Technical Specifications (Attachment B – Part 4), unless otherwise directed by the Engineer in writing.

C. Furnish the design, materials, and methods required for construction of the temporary water treatment system. Working drawings and supporting computations for the water treatment system are to be prepared and stamped by a Professional Engineer licensed to practice in the State of New York.

D. Pay all fines and penalties associated with non-conformance of the water treatment system that may be assessed by the authority granting the permit.

E. Verify the requirements with the permit issuing authority and make any required adjustments prior to, and during the performance of the Work. Notify the CM/Engineer of any changes to the requirements of the permit during the Work. .

1.2. SUBMITTALS

A. In the water treatment section of the Site Operations Plan submit the following information:

1. Description of water treatment system, equipment (including size and capacity), processes, secondary containment, and monitoring.

2. Operation & maintenance plan to include regular maintenance, routine inspection requirements, daily operating procedures, and record keeping.

3. Calculations and supporting documentation for the water treatment system design, component selection, and sizing.

4. Description of the phasing and coordination between the water treatment system, excavation, and dewatering portions of the Work.

5. A backup liquid disposal contingency plan.

PART 2 PRODUCTS

2.1 PRIMARY WATER TREATMENT EQUIPMENT

A. Provide a system capable of performing the following unit process functions:

1. Separation, recovery and adsorption of LNAPL and DNAPL recovered with the water.
2. Removal of suspended solids by gravity separation and filtration.
3. Removal of volatile and semi-volatile organic compounds to the limits set forth by the permit issuing authority.
4. Removal of metals to the limits set forth by the permit issuing authority.
5. Discharge flow metering.

B. Choose the type and size of equipment and components needed to accomplish the functions designated in A. The total continuous flow and treatment capacity of the system shall be not less than 200 gpm, and capable of effective operations at lower flow rates. The storage capacity shall be not less than 40,000 gallons.

C. Provide a standby generator with sufficient capacity to provide power to the water treatment system and dewatering operations in the case of hard line electrical outage. Wire the equipment such that dewatering and treatment may continue without interruption or with only minor interruption in the event of a power outage.

D. Provide freeze protection for all water treatment system equipment, piping, and pipe connections to allow for operation through the winter months, including but not limited to: insulation, enclosures, heaters, heat tapes, and circulation pumps.

E. The materials and equipment used for the water treatment system may be new or used but must be suitable for the Work and be maintained in good condition.

F. Keep on hand, or have immediate access to, spare components to provide reasonably for any breakdown.

G. All water treatment and storage equipment is to remain property of the Contractor or Subcontractor. Decontaminated all water treatment equipment prior to removal from the Site, as specified in Specification 01 50 00 – Temporary Facilities and Controls.

H. Provide and maintain a flow meter that meets the requirements of the discharge permit and is capable of recording instantaneous and totalized flow. Provide calibration records for the meter.

I. Provide sampling ports for collecting samples in accordance with the requirements of the discharge permit.

J. Provide adequate freeze protection for the operations and protection of all water treatment equipment.

K. Provide all necessary safety equipment and personnel protective equipment for safe handling of contaminated water and water treatment chemicals.

2.2 WATER TREATMENT SYSTEM CONTROLS

A. Provide adequate system controls to permit unattended operation with occasional operator checks for monitoring and adjustments.

B. Provide a notification system, such as pressure gages, to alert an operator if the system experiences conditions that will potentially cause the treatment system to shutdown.

C. Provide high-level alarms on tanks to prevent overflow conditions. Alarms may cause automatic actions to relieve the condition or may warn the operator.

D. If an upset condition occurs, which may result in a release or nonconformance with the discharge permit, immediately suspend operation and notify the CM/Engineer.

PART 3 EXECUTION

3.1 WATER TREATMENT - GENERAL

A. Furnish all labor, materials and equipment, and perform all operations required to design, furnish, install, test, operate, and maintain the water treatment equipment, including: storage tanks, pumps, process equipment, water treatment chemicals, water meters, process controls, operator alarms, dikes, sandbags, electric power supply and distribution, and domestic water supply and distribution, as required to treat the collected water.

B. Perform a pre-production test of the entire water treatment system in accordance with the requirements of the discharge permit and any other applicable required permits. At a minimum, the pre-production test shall consist of the collection and treatment of one settling tank of representative groundwater. Prior to discharge, analytical test results for treated samples collected under the supervision of the CM/Engineer shall demonstrate that the treated water is in compliance with the discharge permit requirements.

C. Discharge the water treatment system at a location that has been approved by the CM/Engineer.

D. Place equipment at a location approved by the CM/Engineer. Equipment, in as much as possible, shall be located in a permanent location for the entire duration of the Project.

E. Arrange components and provide means to contain any spills or overflows from the treatment process within the Site.

F. Provide spill containment for any water treatment chemicals used on the Site.

G. Provide additional erosion and sediment control measures, as necessary, to ensure that all components of the water treatment system are enclosed.

H. Establish, maintain, and document quality control, as required in Specifications 01 33 00 – Submittal Procedures.

I. The CM/Engineer may specify and require additional records from the Contractor as needed to satisfy permit and Project requirements.

3.2 SEQUENCING AND SCHEDULING

A. Conduct water treatment activities in conjunction and coordination with decontamination, excavation, drilling, dewatering, and backfilling Work. Coordinate water treatment with all other Site activities.

B. Provide a water treatment system with the treatment and storage capacity to manage water from dewatering and decontamination Work without causing construction delays. Store water to be treated and schedule treatment periods in order to minimize intermittent treatment of small batches of water and to maximize the quantity of water treated in an operational week.

3.3 DISPOSAL OF OTHER RESIDUALS

A. Manage settled solids, collected NAPL, and spent filtration and granular activated carbon adsorption media in accordance with all transportation laws, regulations, and the receiving facility requirements.

3.4 SAMPLING AND CHEMICAL ANALYSIS

A. Sampling and laboratory analyses as required by the discharge permit shall be performed by the Contractor.

B. Sampling and laboratory analyses conducted for off-Site disposal of wastewater shall be performed by the Contractor.

C. All laboratory analyses shall be conducted by a laboratory that is appropriately licensed to perform such Work in the State of New York.

D. Results of the laboratory analysis shall be forwarded to the CM/Engineer by the Contractor upon receipt.

END OF SECTION 44 01 40

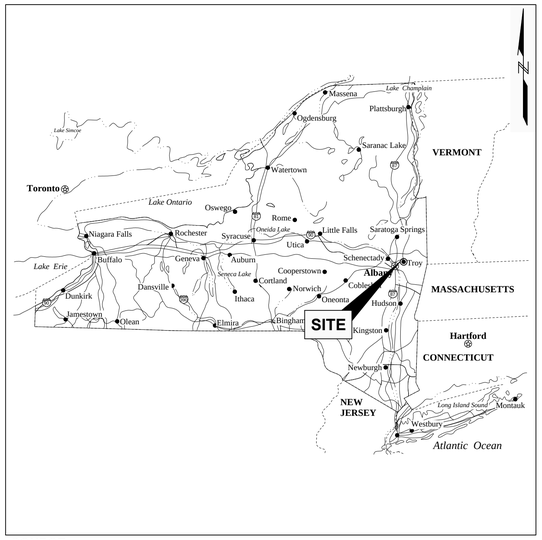
REMEDIAL ACTION DRAWINGS

TROY (SMITH AVE.) FORMER MANUFACTURED GAS PLANT (MGP) SITE

NYSDEC SITE NO. 442030

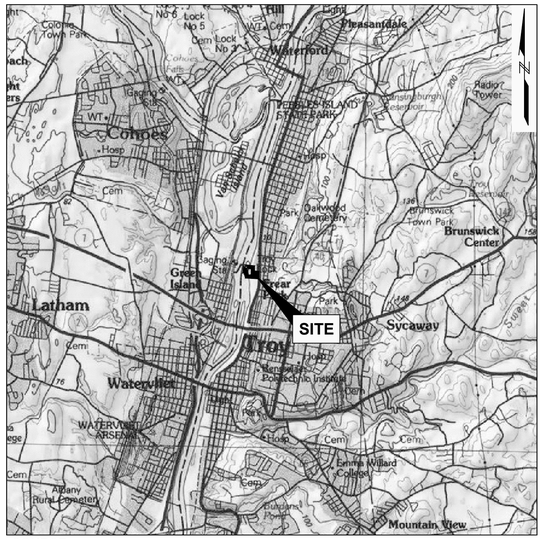
OPERATIONAL UNITS NO. 1 AND NO. 3 (OU-1 & OU-3)

CITY OF TROY, RENSSELAER COUNTY, NEW YORK



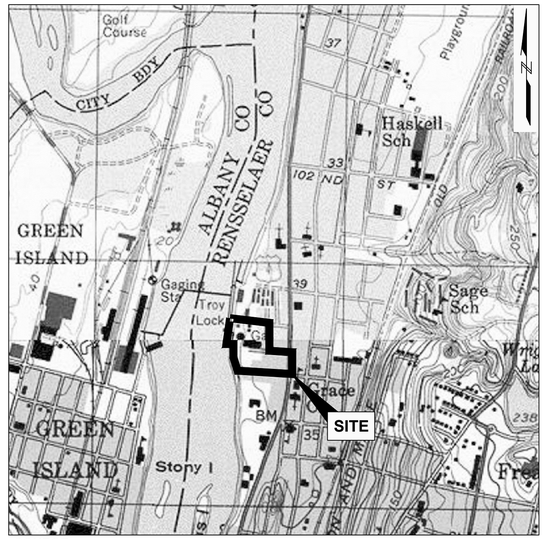
SOURCE:
MAP IMAGE PREPARED BY MAGELLAN GEOGRAPHIX, SANTA BARBARA, CA, 1994.

STATE MAP
APPROXIMATE SCALE: 1" = 100 MILES



SOURCE:
U.S.G.S. TOPOGRAPHIC MAPS, 1:24,000, TROY NORTH, NY, AND TROY SOUTH, NY.
MAP CREATED WITH TOPO! ® ©2001 NATIONAL GEOGRAPHIC (www.nationalgeographic.com/topo).

REGIONAL MAP
SCALE: 1" = 1 MILE



SOURCE:
U.S.G.S. TOPOGRAPHIC MAPS, 1:24,000, TROY NORTH, NY, AND TROY SOUTH, NY.
MAP CREATED WITH TOPO! ® ©2001 NATIONAL GEOGRAPHIC (www.nationalgeographic.com/topo).

SITE LOCATION
SCALE: 1" = 2000'

PREPARED FOR:

NATIONAL GRID

300 ERIE BOULEVARD WEST

SYRACUSE, NY 13202

GEI Consultants Inc. PC
1301 Trumansburg Road, Suite N
Ithaca, New York
607-216-8955
WWW.GEICONSULTANTS.COM

PROJECT NUMBER: 116830

JUNE 13, 2014

FOR BID

NO.	DATE	DESCRIPTION	DES	DR	CH	APP
1	08/04/14	ADDENDUM 1 - UPDATE DRAWING LIST	STD	DTE	JTF	JTF
0	06/13/14	FOR BID	STD	DTE	JTF	JTF

DWG. NO. G1

SHEET NO. 1 of 35

STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

\\th1v-fs01\Data\Tech\Project\National Grid\TROY SMITH AVE\CAD\DRAWINGS\Design\100% Submittal-Revision 1\1 - G1 Cover Sheet 8/5/2014

A. GENERAL CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL NOTE THE LOCATION OF ANY EXISTING FENCE AND GATES THAT MAY BE IMPACTED BY PROJECT CONSTRUCTION. DURING CONSTRUCTION, TEMPORARY FENCING SHALL BE INSTALLED AND THE SITE AREA SHALL BE SECURELY MAINTAINED. UPON COMPLETION OF CONSTRUCTION, THE TEMPORARY FENCING SHALL BE REMOVED AND THE FENCE SHALL BE REBUILT ALONG ITS ORIGINAL EXTENT, EXCEPT WHERE THE NEW FENCE IS DEPICTED ON THE PLANS. FOR ALL FENCE ON OR ADJOINING USACE PROPERTIES, CONTRACTOR SHALL USE USACE STANDARD SECURITY FENCING.
2. THE CONTRACTOR SHOULD WORK FROM NATIONAL GRID PROPERTY TO THE MAXIMUM EXTENT. THE CONTRACTOR SHALL PROVIDE A TEMPORARY SECURITY FENCE AND SECURITY PERSONNEL AT THE SITE IF THE USACE FENCE IS REMOVED.
3. LOCAL FIRE DEPARTMENTS AND EMERGENCY MANAGEMENT TEAMS SHALL BE MADE AWARE OF SITE ACTIVITIES PRIOR TO INITIATION OF REMEDIAL ACTIVITIES.
4. ALL CONSTRUCTION ACTIVITIES, INCLUDING OPERATION OF MACHINERY, EXCAVATION, FILLING, GRADING, CLEARING OF VEGETATION, DISPOSAL OF WASTE, AND STOCKPILING OF MATERIAL SHALL TAKE PLACE WITHIN THE APPROVED WORK AREA AS DEPICTED ON THE CONSTRUCTION DRAWINGS AND/OR AS SPECIFIED IN THE CONTRACT DOCUMENTS. CONTRACTOR SHALL MANAGE ALL TRAFFIC WITHIN THE CONSTRUCTION AREA.
5. THE CONTRACTOR SHALL LIMIT MOVEMENT OF CREWS, VEHICLES, AND EQUIPMENT ON APPROVED ACCESS ROADS TO MINIMIZE DAMAGE TO PROPERTIES AND DISRUPTION OF NORMAL LAND USE ACTIVITY.
6. THE CONTRACTOR SHALL PARK PERSONNEL AND CONSTRUCTION VEHICLES IN AREAS DESIGNATED IN SUCH A WAY THAT THEY SHALL NOT INTERFERE WITH NORMAL TRAFFIC, CAUSE AND SAFETY HAZARD, AND INTERFERE WITH EXISTING LAND USE OUTSIDE OF THE SITE AS WELL AS WITH OTHER ACTIVITIES WITHIN THE SITE.
7. THE DISPOSAL OF TREES, BRUSH, EXCAVATED SOILS OR OTHER DEBRIS IN ANY STREAM CORRIDOR, WETLAND, OR SURFACE WATER, IS PROHIBITED.
8. WASTE WATERS FROM CONSTRUCTION OPERATIONS SHALL NOT ENTER STREAMS, WATER COURSES OR OTHER SURFACE WATERS WITHOUT THE USE OF APPROPRIATE AND APPROVED TURBIDITY CONTROL METHODS AND COMPLYING WITH THE PERTINENT FEDERAL, STATE, AND/OR LOCAL REGULATIONS.
9. ALL VEHICLES EXITING THE SITE MUST PASS THROUGH A TIRE WASH/DECONTAMINATION ZONE, WHERE VISIBLE DIRT WILL BE REMOVED FROM THE TIRES AND OTHER PARTS OF THE VEHICLES.
10. NOISE IMPACTS SHALL BE MINIMIZED AND MITIGATED. CONTRACTOR SHALL COMPLY WITH STATE AND LOCAL NOISE ORDINANCES, INCLUDING POTENTIAL RESTRICTION OF WORK HOURS AS SET FORTH IN THOSE REGULATIONS. CONTRACTOR SHALL MAINTAIN ALL EQUIPMENT IN GOOD OPERATING CONDITIONS AND ALL MOTORS AND ENGINES SHALL BE MUFFLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. ANY FAULTY NOISE SUPPRESSOR SHALL BE REPAIRED OR REPLACED.
11. ALL EXISTING WELLS WITHIN THE SITE AREA WILL BE ABANDONED AS REQUIRED BY NYSDEC CP-43 GROUNDWATER MONITORING WELL DECOMMISSION POLICY. WELL ABANDONMENT WILL NOT BE CONDUCTED BY THE CONTRACTOR, BUT THE ACTIVITY BY OTHERS WILL BE COORDINATED BY NATIONAL GRID WITH THE CONTRACTOR.
12. THE CONTRACTOR SHALL PROVIDE SAFE PEDESTRIAN ACCESS AND PROTECTION ADJACENT TO WORK AREA THROUGHOUT THE DURATION OF THE PROJECT.
13. CONTRACTOR SHALL PERFORM WORK IN ACCORDANCE WITH USACE PERMIT AND NYSDEC WATER QUALITY CERTIFICATION (WQC) FOR THE PROJECT.

B. GENERAL NOTES FOR SURVEY

1. BASE MAP ADAPTED FROM NIAGARA MOHAWK DRAWING NO. D-31434-E INDEX 21.0-R1.16-M49, DATED SEPTEMBER 8, 1994.
2. RETTEW ASSOCIATES PERFORMED GROUND SURVEY TO OBTAIN DATA REQUIRED FOR DESIGN IN NOVEMBER 2008.
3. ADDITIONAL EXISTING CONDITIONS SURVEYED BY CT MALE ON APRIL 26, 2013 AND APRIL 18, 2014.
4. THE EXISTING CONDITIONS DRAWING NO. V1 INCORPORATES BASE MAP PROVIDED BY NIAGARA MOHAWK, THE SURVEY PERFORMED BY RETTEW ASSOCIATES, AND THE SURVEY PERFORMED BY CT MALE.
5. COORDINATE AND HORIZONTAL REFERENCE BASED ON NEW YORK EAST ZONE (3101) NORTH AMERICAN DATUM OF 1983 (NAD 83). VERTICAL DATUM IS BASED UPON USC&G DATUM (NAVD 88) OBTAINED BY DIFFERENTIAL LEVELING AND STATIC GPS METHODS.
6. SEDIMENT CONTOURS BASED ON OCEAN SURVEYS, INC. BATHYMETRIC SURVEY PERFORMED MAY 9-11, 2012. GRID SYSTEM IS THE NEW YORK EAST STATE PLANE COORDINATE SYSTE, NAD 83.
7. SEDIMENT ELEVATIONS ARE IN FEET AND ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88) BASED ON BENCHMARK "SOUTH POINT" HAVING AN ELEVATION OF 23.858 FEET NAVD 88 PER OPUS OBSERVATIONS MADE BY OCEAN SURVEYS, INC. DEPTHS WERE DEVELOPED FROM ONE FOOT BY ONE FOOT BINNED DATA WITH THE AVERAGE ELEVATION WITHIN EACH BIN POSTED IN THE CENTER OF THE BIN.
8. SEDIMENT CONTOURS ARE IN FEET AND WERE GENERATED USING "QUICKSURF" OPERATING WITHIN AUTODESK "AUTOCAD".
9. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOW IN 2011 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
10. THE TOP OF SEDIMENT ELEVATION INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A MULTIBEAM SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON THE 9TH TO THE 11TH OF MAY 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.
11. THE TROY-1 ACOUSTIC DOPPLER VELOCIMETER (ADV) EXPERIENCED AN INTERNAL FAILURE SIX DAYS AFTER DEPLOYMENT. THE TROY-1 ADV WAS REPAIRED AND REDEPLOYED ON JULY 24, 2012. THE LOCATIONS OF THE FIRST AND SECOND DEPLOYMENT ARE INDICATED BY "-1" AND "-2".
12. SEE FIGURE 1 FOR VERTICAL DATUM RELATIONSHIPS.
13. ALL CONSTRUCTION STAKEOUT SHALL BE PERFORMED UNDER THE SUPERVISION OF A NEW YORK STATE LICENSED SURVEYOR.

C. GENERAL NOTES FOR UTLIITIES

1. VERIFY ALL UTILITY LOCATIONS AND DEPTHS PRIOR TO BEGINNING WORK BY POSITIVE IDENTIFICATION USING AIR KNIFE. AT LEAST 48 HOURS PRIOR TO DIGGING, THE CONTRACTOR SHALL CALL "DIG SAFELY, NEW YORK", TELEPHONE NUMBER 315-437-7394 AND OTHER FOR UTILITY MARKOUTS.
2. THE CONTRACTOR SHALL USE HAND DIGGING AND/OR VACUUM EXCAVATOR WHEN EXCAVATING NEAR EXISTING UTILITIES AND EXISTING ANCHOR TIE RODS. EXTREME CAUTION SHALL BE EXERCISED WHILE EXCAVATING, INSTALLING, BACKFILLING, OR COMPACTING AROUND THE UTILITIES AND EXISTING ANCHOR TIERODS.
3. AS REQUIRED, UTILITY LINES OWNED BY NATIONAL GRID WILL BE RELOCATED TO FACILITATE CONSTRUCTION ACTIVITIES. VERIFICATION OF THE PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO INITIATING WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL COORDINATE ALL UTILITY RELOCATION WITH NATIONAL GRID'S PROJECT MANAGER.

D. GENERAL NOTES FOR WORK AND EQUIPMENT RESTRICTIONS

1. ENCROACHMENT INTO THE LOCK APPROACH SHALL BE MINIMIZED. THE CONTRACTOR SHALL PLAN THAT ANY WORK WITHIN AND NEAR THE LOCK APPROACH WILL BE CONDUCTED DURING OCTOBER THROUGH APRIL. LOCK OPERATION HOURS ARE 16 HOURS A DAY, 6 AM TO 10 PM FROM MAY 1 TO NOVEMBER 30. THE LOCK IS CLOSED FROM DECEMBER 1 THROUGH APRIL 30. VESSELS AND EQUIPMENT IN THE LOCK APPROACH CHANNEL WILL BE REQUIRED TO MOVE IN A REASONABLE PERIOD OF TIME (E.G. CLEAR CHANNEL WITHIN 45 MINUTES FOR VESSELS THAT NEED THE ENTIRE 40-FOOT CHANNEL) SHOULD THIS BE REQUIRED BY THE USACE. THERE IS APPROXIMATELY 40 TO 45 FEET AVAILABLE FOR WORKING SPACE BETWEEN THE EDGE OF THE CHANNEL AND THE FACE OF THE EXISTING BULKHEAD. SOME VESSELS MAY REQUIRE MORE CLEARANCE FOR MOVEMENT OF EQUIPMENT. AN UNOBSTRUCTED CHANNEL WIDTH OF AT LEAST 40 FEET MUST BE MAINTAINED.
2. CONTRACTOR IS PROHIBITED FROM PERFORMING WORK ON TOP OF THE LOCK WALLS, GUIDE WALLS AND LOCKS.
3. THE USE OF EQUIPMENT IN LOCK APPROACH AREA IS STRICTLY PROHIBITED, UNLESS APPROVAL HAS BEEN OBTAINED FROM THE USACE AND NATIONAL GRID.
4. THERE ARE NO WORK HOUR RESTRICTIONS FOR USACE. CONTRACTOR SHALL VERIFY AND COMPLY WITH ANY CITY OF TROY WORK HOUR RESTRICTION FOR THE PROJECT.
5. CONTRACTOR SHALL FOLLOW CONSTRUCTION SEQUENCING AS SHOWN ON DRAWING G3. NO HEAVY CONSTRUCTION EQUIPMENT AND VEHICLES SHALL BE ALLOWED ON LAND WITHIN A 40-FOOT ZONE BEHIND THE EXISTING BULKHEAD WALL UNTIL THE SECANT WALL PILE WALL IS INSTALLED AND PROPERLY TIED TO THE ANCHORED PILES AND RELIEVING PLATFORM. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.

E. GENERAL NOTES FOR SITE AIR AND STORMWATER CONTROL

1. CONTRACTOR SHALL COMPLY WITH THE COMMUNITY AIR MONITORING PLAN WHICH HAS BEEN PREPARED BY GEI FOR NATIONAL GRID.
2. THE CONTRACTOR SHALL COMPLY WITH THE EROSION AND SEDIMENT CONTROL PLAN AS SHOWN ON DRAWINGS C1 AND C2.

F. GENERAL NOTES FOR WORK AND SITE INSPECTION

1. REPRESENTATIVE FROM THE USACE AND/OR THE NYSDEC SHALL BE PERMITTED TO INSPECT THE SITE (INCLUDING RELEVANT RECORDS) AT ANY TIME DEEMED NECESSARY TO ENSURE THAT ALL ACTIVITIES ARE IN ACCORDANCE WITH CONTRACT REQUIREMENTS, APPROVED SITE PLANS AND THE TERMS AND CONDITIONS SPECIFIED IN THE ISSUED PERMITS.
2. NATIONAL GRID'S CONSTRUCTION MANAGER AND/OR ITS REPRESENTATIVES SHALL BE NOTICED A MINIMUM OF 24 HOURS IN ADVANCE BEFORE ANY EXCAVATION, CONSTRUCTION, INSTALLATION, TESTING AND BACKFILLING ACTIVITIES.

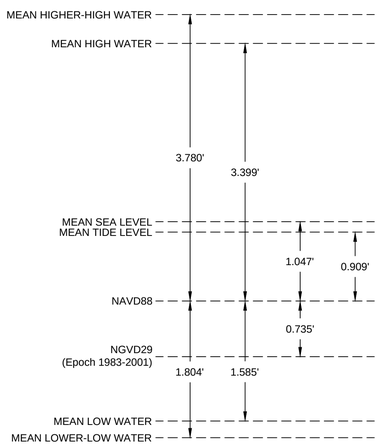
G. GENERAL NOTES FOR IN-WATER WORK

1. THE CONTRACTOR MUST NOTIFY THE USCG TWO WEEKS PRIOR TO START OF ANY IN-WATER WORK IN ORDER THAT A "NOTICE TO MARINERS" MAY BE ISSUED PRIOR TO MOBILIZATION. THE LOCATION, DURATION, NATURE OF THE WORK, AND THE LOCATION OF TEMPORARY AND LONG-TERM PLACEMENT OF PRIVATE AIDS TO NAVIGATION WILL BE PRESENTED TO THE AGENCY.

ABBREVIATIONS AND ACRONYMS

CAMP	COMMUNITY AIR-MONITORING PLAN
CRZ	CONTAMINANT REDUCTION ZONE
dBA	DECIBEL
EL	ELEVATION
EZ	EXCLUSION ZONE
GEI	GEI CONSULTANTS, INC., P.C.
GM	GENERAL METHOD
GRI	GEOSYNTHETIC RESEARCH INSTITUTE
HDPE	HIGH DENSITY POLYETHYLENE
INV.	PIPE INVERT
IPS	INCHES PER SECOND
MGP	MANUFACTURED GAS PLANT
MH	MANHOLE
MHHW	MEAN HIGHER-HIGH WATER
MLLW	MEAN LOWER-LOW WATER
NAD83	NORTH AMERICAN DATUM OF 1983
NAPL	NON-AQUEOUS PHASE LIQUID
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
NYCDEP	NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NYSDOT	NEW YORK STATE DEPARTMENT OF TRANSPORTATION
PAH	POLYCYCLIC AROMATIC HYDROCARBON
PE	POLYETHYLENE
PEL	PERMISSIBLE EXPOSURE LIMITS
POTW	PUBLICLY OWNED TREATMENT WORKS
PVC	POLYVINYL CHLORIDE
QA/QC	QUALITY ASSURANCE/QUALITY CONTROL
RI	REMEDIAL INVESTIGATION
SPDES	STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM
SVOC	SEMIVOLATILE ORGANIC COMPOUND
SZ	SUPPORT ZONE
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
VOC	VOLATILE ORGANIC COMPOUND

FIGURE 1: VERTICAL DATUM RELATIONSHIPS



DATUM ABBREVIATIONS

MHHW	MEAN HIGHER-HIGH WATER
MHW	MEAN HIGH WATER
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
NGVD29	NATIONAL GEODETIC VERTICAL DATUM 1929
MSL	MEAN SEA LEVEL DATUM
MTL	MEAN TIDE LEVEL
MLW	MEAN LOW WATER
MLLW	MEAN LOWER-LOW WATER

GENERAL LEGEND:

- PROJECT LIMIT
- MAJOR CONTOUR
- MINOR CONTOUR
- EXISTING BUILDING
- TREE / SHRUB
- FENCE
- GAS LINE
- ELECTRIC
- WATER
- SANITARY SEWER
- STORM WATER
- COMMUNICATIONS
- SHEET PILE
- SECANT PILE
- GAS VALVE
- BOLLARD
- UTILITY POLE

FOR BID

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed: CKT
Checked: JTF
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/13/2014

GEI Consultants Inc, PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

GEI Project 116830

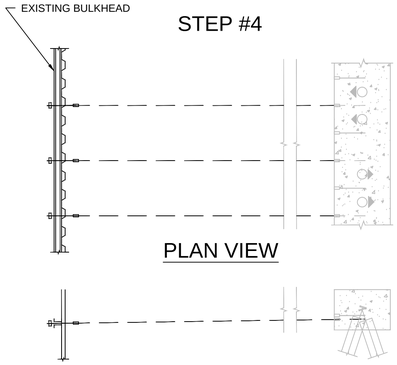
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

GENERAL NOTES, LEGEND, AND ABBREVIATIONS

DWG. NO. G2

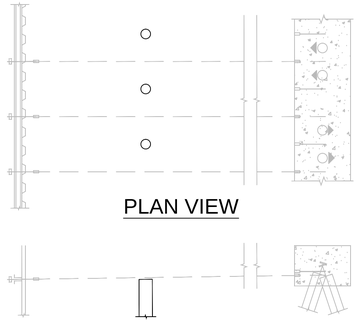
SHEET NO. 2 of 35

STEP #4



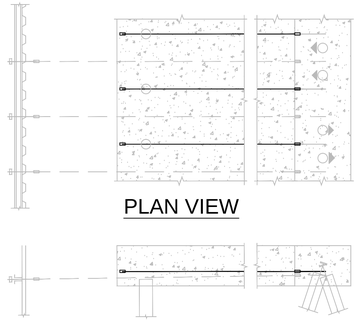
INSTALL TEMPORARY WALE OR USE EXISTING WALE. EXTEND "PHASE 1" TEMPORARY TIE RODS FROM ANCHOR BEAM TO THE TEMPORARY/EXISTING WALE.

STEP #5



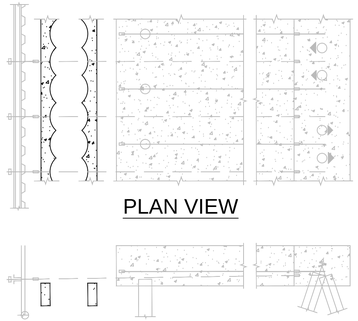
DRILL VERTICAL MICROPILES. PROTECT TEMPORARY TIE RODS.

STEP #6



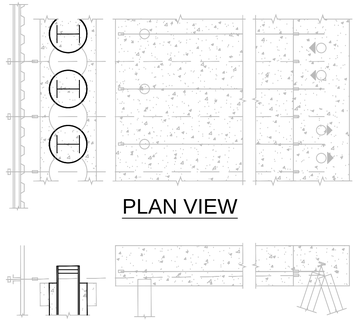
EXTEND PERMANENT TIE RODS FROM ANCHOR BEAM TO END OF RELIEVING PLATFORM. PLACE RELIEVING PLATFORM CONCRETE.

STEP #7



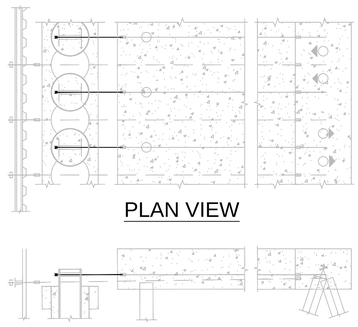
INSTALL SECANT PILE GUIDE WALL.

STEP #8



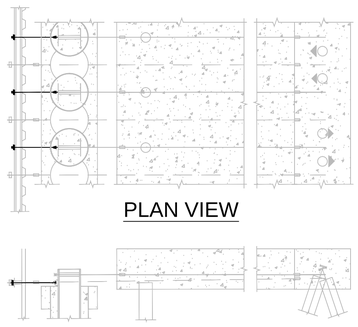
DRILL AND INSTALL PRIMARY SECANT PILES AND CORE BEAMS.

STEP #9



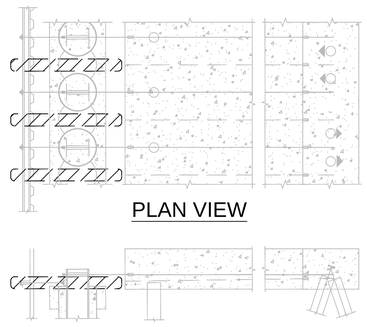
INSTALL PERMANENT TIE ROD EXTENSIONS FROM RELIEVING PLATFORM AND CONNECT TO SECANT PILE CORE BEAMS (CUT OFF OR BURN HOLES IN EXISTING SHEETS AS REQUIRED TO INSTALL).

STEP #10



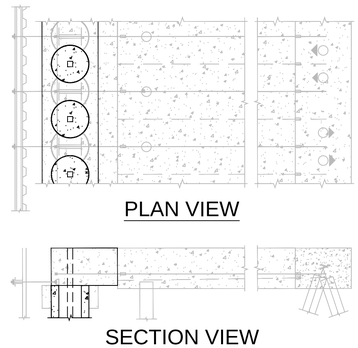
INSTALL TEMPORARY "PHASE 2" TIE ROD STUBS AND CONNECT CORE BEAMS TO TEMPORARY/EXISTING WALE.

STEP #11



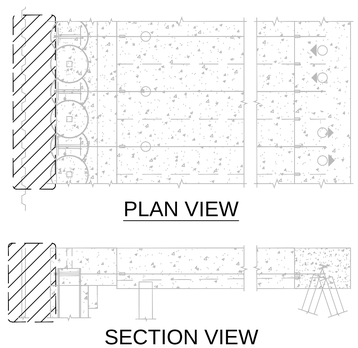
DISCONNECT AND CUT OFF TEMPORARY "PHASE 1" TIE RODS.

STEP #12



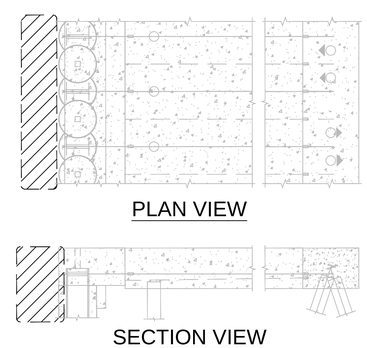
DRILL AND INSTALL SECONDARY SECANT PILES WITH GROUT TUBE AND FENDER CONNECTIONS. PLACE CAP BEAM CONCRETE.

STEP #14



REMOVE TEMPORARY "PHASE 2" TIE ROD STUBS AND TEMPORARY/EXISTING WALE.

STEP #15



DEMO EXISTING SHEET PILE WALL. REMOVE TOE BERM (TOE BERM NOT SHOWN).

CONSTRUCTION SEQUENCE STEPS:

1. INSTALL TEMPORARY WATERSIDE TOE BERM (NOT SHOWN, PERFORMED UNDER SEPARATE CONTRACT).
2. REMEDIATE GAS HOLDER (NOT SHOWN).
3. INSTALL BATTER PILES AND CAST ANCHOR BEAM (NOT SHOWN).

4-12. SEE GRAPHICS THIS SHEET.

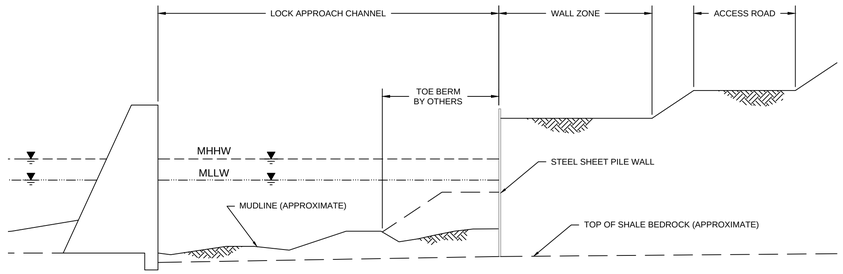
13. DEMO WEST SECANT PILE GUIDE WALL AND EXCAVATE BETWEEN SECANT PILE AND SHEET PILE WALL USING VACUUM AND/OR AIR LIFTING TO TOP OF TOE BERM ELEVATION (NOT SHOWN).

14-15. SEE GRAPHICS THIS SHEET.

16. PERFORM DREDGING AND AQUATIC FILLING IN LOCK APPROACH CHANNEL (NOT SHOWN).

LEGEND:

- VERTICAL MICROPILE
- BATTERED MICROPILE
- SECANT PILE CORE BEAM
- EXISTING SHEET PILE WALL



FOR BID

CONSTRUCTION SEQUENCE NOTES

1. CONSTRUCTION SEQUENCE SECTION VIEW DRAWINGS ARE NOT TO SCALE.
2. STRUCTURAL DETAILS ARE PRESENTED IN S-SERIES DRAWINGS.

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	WHW

STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed:	*CBG/STD*
Checked:	*WHW*
Drawn:	*DTE*
Submitted By:	*WHW*
NY P.E. No.:	*86268*
Submittal Date:	06/13/2014

GEI Consultants Inc. P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

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Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

CONSTRUCTION SEQUENCE

DWG. NO. G3

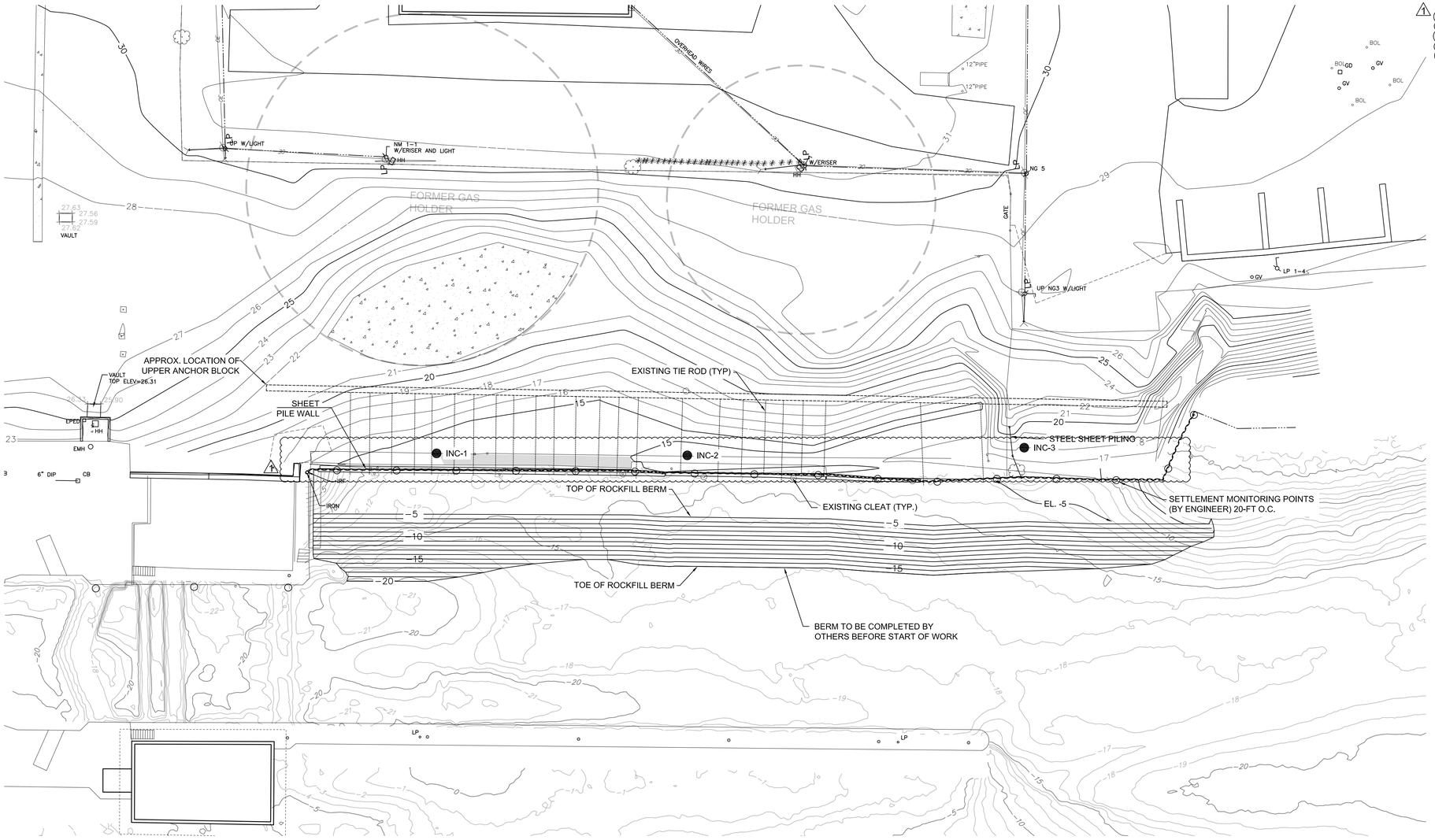
SHEET NO. 3 of 35

LEGEND:

- ○ SETTLEMENT MONITORING POINTS (BY OTHERS)
- ● INC-X PROPOSED INCLINOMETER

NOTES:

1. SMPs INSTALLED BY OTHERS. CONTRACTOR REQUIRED TO MAINTAIN SMPs AND INSTALL NEW POINTS IF SMPs ARE DAMAGED DURING THE REMEDIAL WORK.
2. READ SMPs DAILY FOR THE DURATION OF THE WORK UNLESS OTHERWISE INSTRUCTED BY THE CM/ENGINEER IN WRITING.
3. SEE DRAWING S-3 FOR LOCATIONS AND DETAILS OF INCLINOMETERS.
4. INSTALL INCLINOMETERS A MINIMUM OF 2 WEEKS BEFORE THE TEMPORARY BEAM IS SCHEDULED TO BE REMOVED.
5. READ INCLINOMETERS TWICE PER WEEK UNTIL SECANT PILE WALL IS COMPLETED AND ANCHORED TO THE EXISTING BULKHEAD, AND WEEKLY THEREAFTER FOR THE DURATION OF THE REMEDIAL WORK.



INSTRUMENTATION PLAN

0 20 40
SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - INCLINOMETER LOCATIONS	JTF
0	08/04/2014	ADDENDUM 1 - NEW SHEET FOR BID	WHW

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STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed: *STD*
Checked: *JTF*
Drawn: *DTE*
Submitted By: *WHW*
NY P.E. No.: *86268*
Submittal Date: 06/13/2014

GEI Consultants Inc., PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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Operable Units No. 1 and 3

INSTRUMENTATION PLAN

DWG. NO. G4

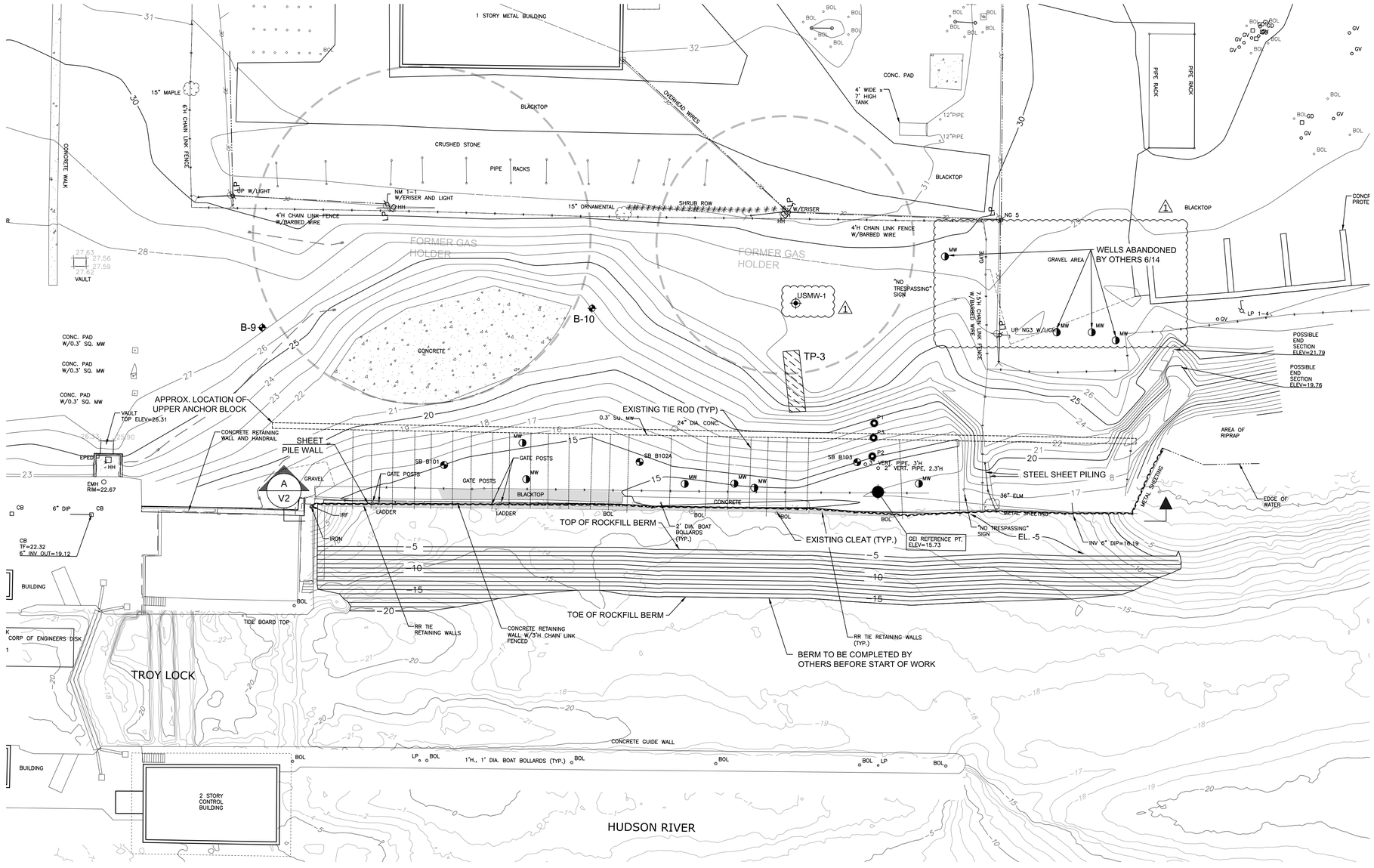
SHEET NO. 4 of 35

LEGEND:

- SOIL BORING
- TEST PIT
- MW — WELL (1)

NOTES:

1. WELL USMW-1 IS LOCATED IN GAS HOLDER NO. 2. MEASUREMENTS ON 6/25/14:
   DEPTH TO WATER = 2.18 FT.
   TOTAL DEPTH = 10.05 FT.
   ODOR AND SHEEN OBSERVED.



EXISTING CONDITIONS PLAN

0 20 40
SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	06/27/2014	UPDATE MONITORING WELLS	WHW
0	06/13/2014	FOR BID	WHW

Attention:
0 1"
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STATE OF NEW YORK · WILLIAM H. WALTON · 086288 · LICENSED PROFESSIONAL ENGINEER

Designed: *STD*
Checked: *JTF*
Drawn: *DTE*
Submitted By: *WHW*
NY P.E. No.: *86268*
Submittal Date: 06/27/2014

GEI Consultants Inc. P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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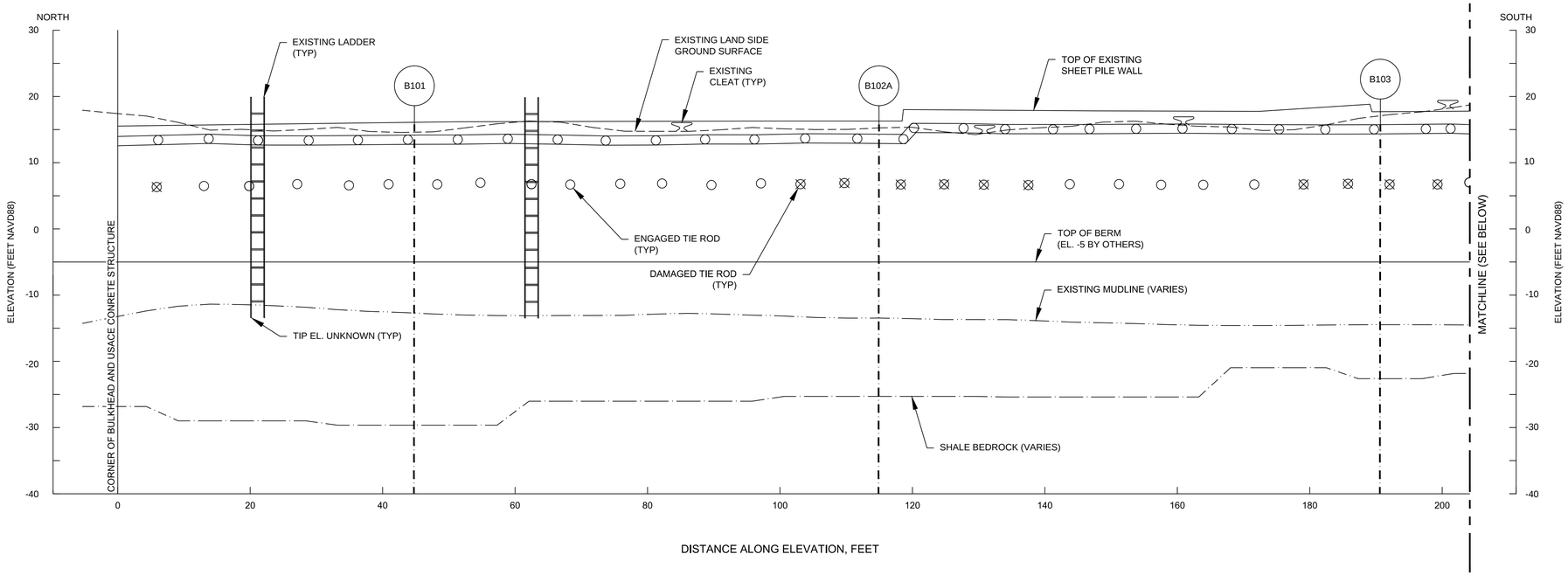
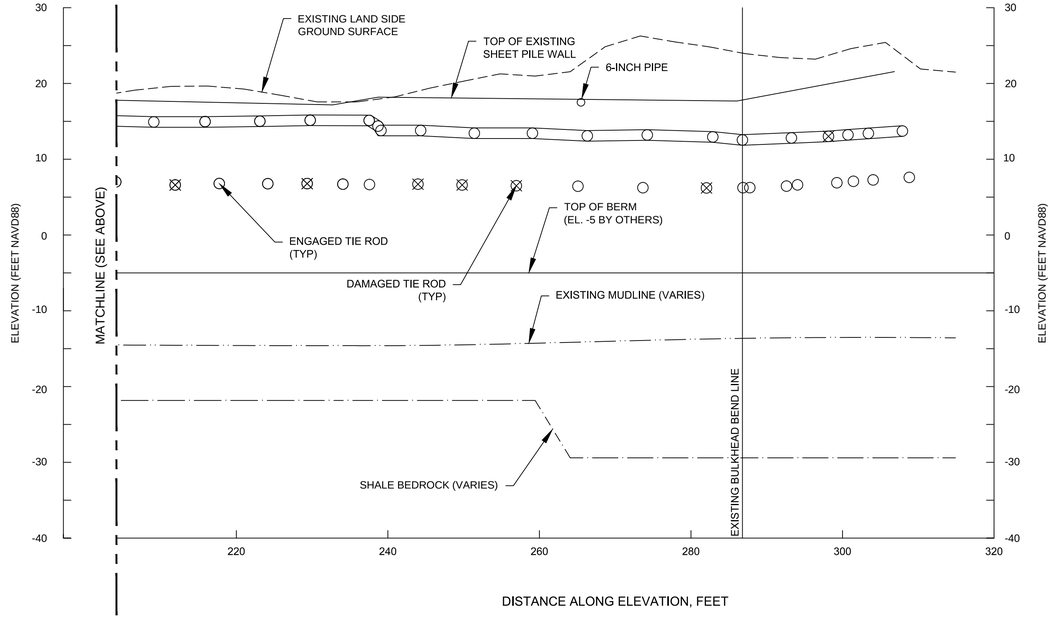
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

EXISTING CONDITIONS
SITE PLAN

DWG. NO. V1

SHEET NO. 5 of 35





LEGEND:

- EXISTING ENGAGED TIE ROD
- EXISTING DAMAGED TIE ROD
- EXISTING GROUND SURFACE
- EXISTING MUDLINE
- SHALE BEDROCK
- TOP OF BERM
- EXISTING SHEETING
- SOIL BORING

NOTES:

1. SHEET PILE WALL SEGMENTS, FENDERS, AND FENCING HAVE BEEN OMITTED FOR CLARITY.
2. TOE ELEVATION OF EXISTING BULKHEAD IS UNKNOWN.
3. SEE SHEET V1 FOR BORING LOCATIONS AND SHEET C12 FOR BORING LOGS.

ELEVATION
EXISTING BULKHEAD WALL
A / V1

SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	WHW

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STATE OF NEW YORK · WILLIAM H. WALTON · 086288 · LICENSED PROFESSIONAL ENGINEER

Designed: STD
Checked: JTF
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86268
Submittal Date: 06/13/2014

GEI Consultants Inc, PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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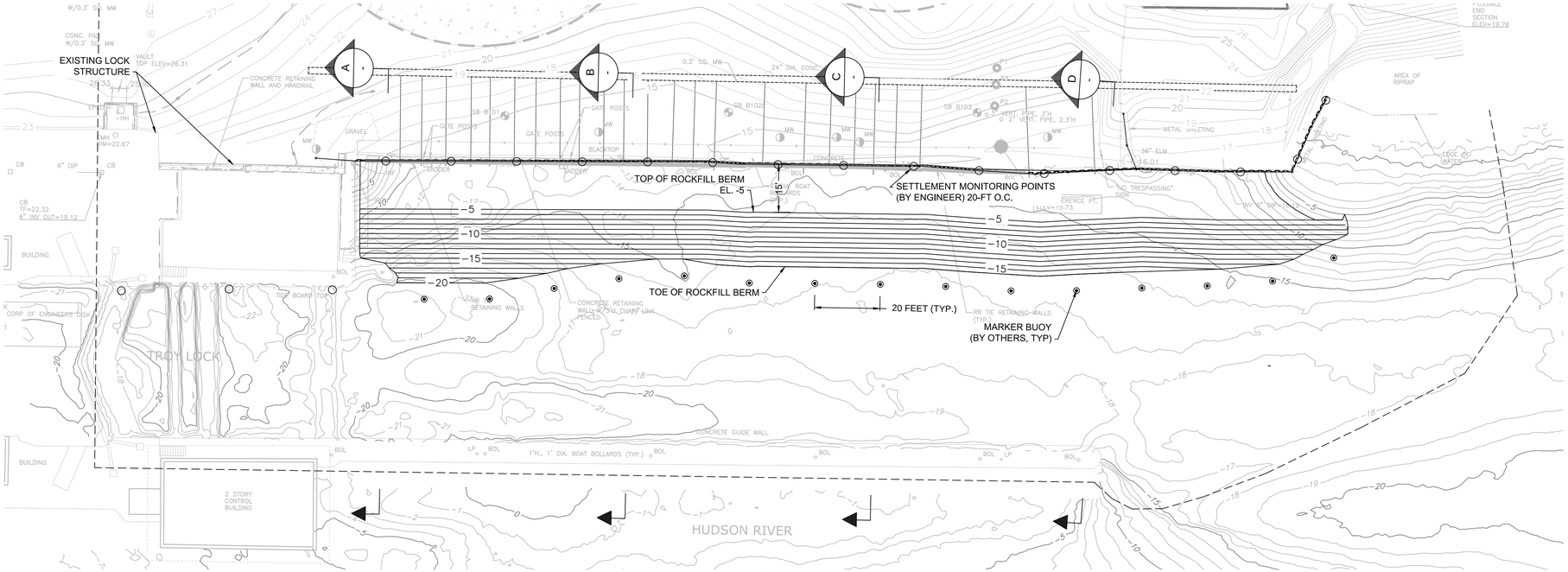
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

EXISTING CONDITIONS:
BULKHEAD WALL ELEVATION

DWG. NO. V2

SHEET NO. 6 of 35



0 20 40
SCALE, FEET

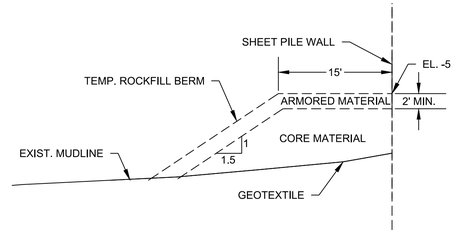
PLAN
TEMPORARY ROCKFILL BERM

LEGEND:

- PROJECT LIMITS
- FIXED TURBIDITY CURTAIN (WITH ABSORBENT BOOM)
- SETTLEMENT MONITORING POINTS (BY ENGINEER)
- TIDE-ADJUSTING MARKER BUOY

NOTES:

1. TEMPORARY ROCKFILL BERM DETAILS PROVIDED FOR INFORMATION ONLY.



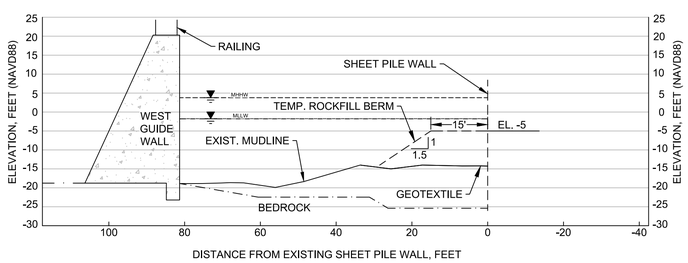
TYPICAL SECTION
TEMP. ROCKFILL BERM
NOT TO SCALE

SECTION A
TYPICAL ROCKFILL BERM

0 20 40
SCALE, FEET

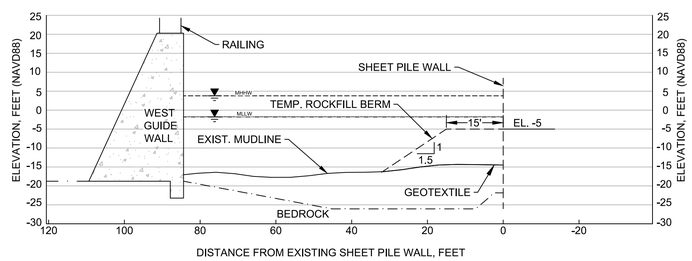
SECTION B
TYPICAL ROCKFILL BERM

0 20 40
SCALE, FEET



SECTION C
TYPICAL ROCKFILL BERM

0 20 40
SCALE, FEET



SECTION D
TYPICAL ROCKFILL BERM

0 20 40
SCALE, FEET

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	WHW

STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed:	FS
Checked:	AJG
Drawn:	DTE
Submitted By:	WHW
NY P.E. No.:	86268
Submittal Date:	06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

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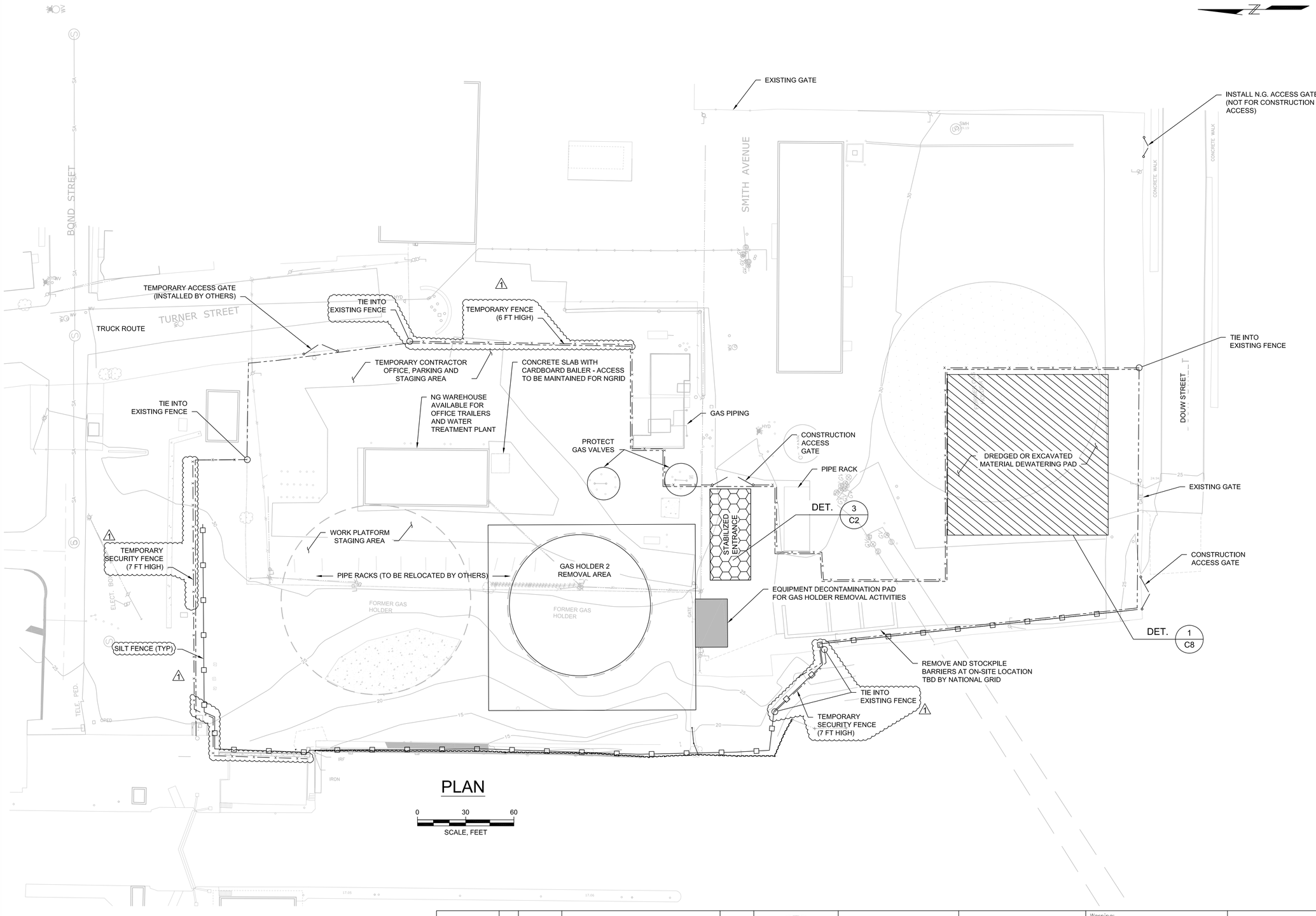
Operable Units No. 1 and 3

TEMPORARY BERM
PLAN AND SECTIONS
(PERFORMED UNDER
SEPARATE CONTRACT)

DWG. NO. V3

SHEET NO. 7 of 35



PLAN

0 30 60

SCALE, FEET

LEGEND:

- ANTI-TRACKING PAD
- DECONTAMINATION PAD
- TEMPORARY FENCE
- SILT FENCE
- LIMIT OF TEMPORARY WORK

STAGING AREA NOTES:

1. EXCAVATED MATERIAL THAT NEEDS TO BE STAGED OVERNIGHT OR LONGER IS TO BE PLACED WITHIN A CONSTRUCTED AREA WITH A 12" BERM (MIN.), AND BOTH A SILT FENCE AND BALE BARRIER AROUND ITS PERIMETER. MATERIAL SHOULD THEN BE COVERED WITH POLY SHEETING (MINIMUM 6-MIL). (SEE DETAIL FOR CONTINGENCY SOILD/DEBRIS MANAGEMENT PAD).
2. NO MATERIAL IS TO BE STAGED WITHIN ANY BARGE LOADING AREA.
3. TEMPORARY 7-FOOT-HIGH SECURITY FENCE TO BE INSTALLED WITH EMBEDDED POSTS. TEMPORARY 6-FOOT-HIGH FENCE CAN BE INSTALLED WITH BALLASTED POSTS.

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - UPDATE FENCING	JTF
0	06/13/2014	FOR BID	JTF

Attention:

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STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed: BEC
Checked: LJW
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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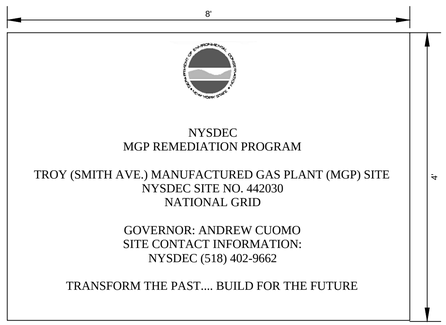
EROSION AND SEDIMENT CONTROL AND FENCING PLAN

DWG. NO. C1

SHEET NO. 8 of 35

\\mc1v-fs01\Data\Tech\Projects\2011\11683-0 NG-Troy Smith Ave MGP\DWGS-GEI\DRAWINGS\Design\100% Submittal-Revision 1\8 - C1 Erosion and Sediment Control Plan_Rev.1 8/25/2014



TYPICAL PERIMETER SIGN DETAIL

NOT TO SCALE

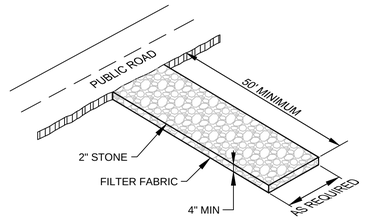
1

SIGN NOTES:

1. SIZE: HORIZONTAL FORMAT 96" BY 48" HIGH.
2. DEC LOGO
   TEXT: PMS 355
   LOGO: PMS 301 BLUE
   PMS 355 GREEN
3. TEXT: CASLON 540

MGP REMEDIATION PROGRAM	PMS 301
SITE NAME, SITE NUMBER, PARTY PERFORMING	PMS 355
NAME OF GOVERNOR	PMS 301
TRANSFORM THE PAST.... BUILD FOR THE FUTURE	PMS 355

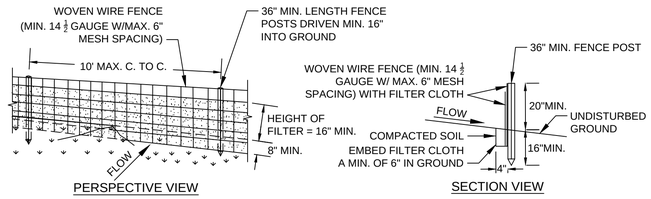
4. CENTER EACH LINE OF COPY WITH SMALL CAPS AND INITIAL CAPS.
5. 96" WIDE BY 48" HIGH ALUMINUM BLANKS WILL BE COVERED WITH VINYL SHEETING TO ACHIEVE BACKGROUND COLOR. COPY LOGO WILL BE SILK SCREENED ON THIS SURFACE.



ANTI-TRACKING PAD DETAIL 3 / C1

NOT TO SCALE

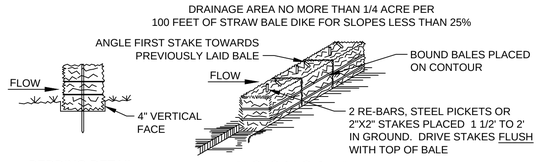
SOURCE:
NEW YORK SOIL AND WATER CONSERVATION COMMITTEE



TYPICAL SILT FENCE DETAIL

NOT TO SCALE

SOURCE:
NEW YORK SOIL AND WATER CONSERVATION COMMITTEE



TYPICAL BALE BARRIER DETAIL

NOT TO SCALE

SOURCE:
NEW YORK SOIL AND WATER CONSERVATION COMMITTEE

GENERAL NOTES:

1. SITE INGRESS/EGRESS AVAILABLE AS IDENTIFIED ONLY.

STAGING AREA NOTES:

1. EXCAVATED MATERIAL THAT NEEDS TO BE STAGED OVERNIGHT OR LONGER IS TO BE PLACED WITHIN A CONSTRUCTED AREA WITH A 12" BERM (MIN.), AND BOTH A SILT FENCE AND BALE BARRIER AROUND IT'S PERIMETER. MATERIAL SHOULD THEN BE COVERED WITH POLY SHEETING (MINIMUM 6-MIL). (SEE DETAIL FOR CONTINGENCY SOILD/DEBRIS MANAGEMENT PAD).
2. NO MATERIAL IS TO BE STAGED WITHIN ANY BARGE LOADING AREA.

NOTES:

1. LAND DISTURBANCE ACTIVITIES SHALL NOT COMMENCE UNTIL APPROVED BY NATIONAL GRID.
2. NO EARTHWORK ACTIVITY TO COMMENCE WITHOUT AN APPROVED STORMWATER POLLUTION PREVENTION PLAN.
3. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO PRECLUDE CONTAMINATION OF ANY WATERWAY BY SUSPENDED SOLIDS, SEDIMENTS, FUELS, SOLVENTS, LUBRICANTS, EPOXY COATINGS, PAINTS, CONCRETE, LEACHATE, OR ANY OTHER ENVIRONMENTALLY DELETERIOUS MATERIALS ASSOCIATED WITH THE PROJECT. THESE MATERIALS SHALL BE STORED A MINIMUM OF 100 FEET FROM ANY WETLAND, STREAM, DITCH, WATERCOURSE, OR DRAINAGE. NO EQUIPMENT RE-FUELING SHALL OCCUR WITHIN THE SAME 100-FOOT AREA.
4. WATER BODIES WILL BE PROTECTED FROM INDIRECT IMPACTS DURING CONSTRUCTION BY UTILIZING VARIOUS EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN, INCLUDING SILT FENCES AND/OR HAY BALES OR TURBIDITY CURTAINS PLACED BETWEEN WATER RESOURCE BOUNDARIES AND CONSTRUCTION AREAS. EXPOSED SOIL WILL BE SEEDED AND/OR MULCHED, AS SOON AS PRACTICABLE, TO ASSURE THAT EROSION AND SILTATION IS KEPT TO A MINIMUM ALONG STREAM.
5. TEMPORARY EROSION CONTROL DEVICES SHALL BE INSTALLED AS SOON AS PRACTICABLE AND APPROPRIATE, AS INDICATED IN THE EROSION CONTROL PLAN. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO ANY GRADING OR FILLING OPERATIONS AND INSTALLATION OF PROPOSED STRUCTURES OR UTILITIES. THEY SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETED AND THE AREA IS STABILIZED AND/OR REVEGETATED. ADDITIONALLY, NO SITE PREPARATION WORK SHALL BE UNDERTAKEN UNTIL ALL REQUIRED EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
6. SILTATION PREVENTION MEASURES, SUCH AS SILT FENCING, HAY BALES OR TURBIDITY CURTAINS, SHALL BE INSTALLED AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, TO PREVENT MOVEMENT OF SILT AND TURBID WATERS FROM THE SITE AND INTO ANY WATER BODY. THEY SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETED AND THE AREA IS STABILIZED AND/OR REVEGETATED.

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7. ALL DISTURBED AREAS WHERE SOIL WILL BE TEMPORARILY EXPOSED OR STOCKPILED FOR LONGER THAN ONE DAY SHALL BE CONTAINED BY A CONTINUOUS LINE OF STAKED HAY BALES/SILT FENCE PLACED ON THE DOWN SLOPE SIDE BETWEEN THE FILL AND WETLAND/WATER BODY. TARPS ARE AUTHORIZED TO SUPPLEMENT THESES APPROVED METHODS. COVER STOCKPILED SOIL AND STOCKPILED SEDIMENT WHEN THE PILE IS NOT ACTIVELY BEING WORKED.
8. ALL AREAS OF SOIL DISTURBANCE RESULTING FROM THIS PROJECT SHALL BE STABILIZED IMMEDIATELY FOLLOWING PROJECT COMPLETION OR PRIOR TO PERMIT EXPIRATION, WHICHEVER COMES FIRST. THE APPROVED METHODOLOGIES ARE AS FOLLOWS:
   A. STABILIZATION OF THE ENTIRE DISTURBED AREA WITH APPROPRIATE VEGETATION (GRASSES, ETC.).
   B. STABILIZATION AS PER SPECIFICATIONS IDENTIFIED ON APPROVED PLANS.
   C. TEMPORARILY STABILIZATION WITH STRAW MULCH OF JUTE MATTING OR OTHER SIMILAR NATURAL FIBER MATTING WITHIN ONE WEEK OF FINAL GRADING. TEMPORARY STABILIZATION SHALL BE MAINTAINED UNTIL A MATURE VEGETATIVE COVER IS ESTABLISHED.
9. VISIBLE TURBID DISCHARGES FROM LAND CLEARING, GRADING OR EXCAVATING ACTIVITIES, OR DE-WATERING OPERATIONS SHALL NOT ENTER A STREAM, NAVIGABLE WATER, OR WETLAND. PRIOR TO ENTRY INTO A STREAM, NAVIGABLE WATER, OR WETLAND, ANY SUCH DISCHARGE SHALL BE:
   A. RETAINED IN AN APPROPRIATELY MAINTAINED UPLAND SETTLING BASIN;
   B. FILTERED THROUGH TURBIDITY CURTAINS TO PREVENT CHANGE IN TURBIDITY OF THE RECEIVING WATER.
10. IN THE EVENT THAT ARCHAEOLOGICAL MATERIALS, HUMAN REMAINS, OR EVIDENCE OF HUMAN BURIALS ARE ENCOUNTERED DURING CONSTRUCTION, ALL WORK IN THE VICINITY OF THE FIND SHALL BE IMMEDIATELY HALTED, THE FIND PROTECTED FROM FURTHER DAMAGE, AND THE EM ADVISED. THE PERMITTEE IS REQUIRED TO NOTIFY THE LOCAL POLICE AND THE STATE HISTORIC PRESERVATION OFFICE IMMEDIATELY FOLLOWING SUCH A DISCOVERY.
11. DURING CONSTRUCTION, SILT CURTAINS AND ABSORBENT BOOMS SHALL BE DEPLOYED AROUND THE CONSTRUCTION AREA, AS DEPICTED ON DRAWING. SILT CURTAINS AND BOOMS SHALL BE INSPECTED TWICE DAILY, PRIOR TO WORK COMMENCING AND AFTER WORK HAS BEEN COMPLETED FOR THE DAY. SILT CURTAINS AND BOOMS WILL ALSO BE INSPECTED AFTER BEING RE-DEPLOYED FOLLOWING MOVEMENT OF THE WORK AREA, OR AFTER ANY UNUSUAL EVENT, TO INCLUDE STORM EVENTS OR COLLISION WITH THE BOOM OR SILT CURTAIN. THE SILT CURTAINS OR BOOMS SHALL BE REPLACED IF DAMAGED, AND THE BOOMS SHALL BE REPLACED AT LEAST WEEKLY, OR IF A VISIBLE NAPL BUILD-UP IS OBSERVED. REPLACEMENT OF THE BOOMS MAY ALSO BE CONDUCTED AT MORE FREQUENT INTERVALS IF DIRECTED BY NATIONAL GRID OR THEIR REPRESENTATIVE. MONITORING OF THE RIVER DOWNSTREAM OF THE CONSTRUCTION AREA FOR TURBIDITY AND APPEARANCE OF SHEENS SHALL BE CONDUCTED AT ALL TIMES WHILE WORK IN THE RIVER IS OCCURRING. TURBIDITY OUTSIDE THE SILT CURTAINS SHOULD NOT EXCEED BACKGROUND CONDITIONS. PRIOR TO THE START OF WORK ACTIVITIES, MONITORS WILL BE DEPLOYED UPSTREAM AND DOWNSTREAM OF THE WORK AREA. TURBIDITY AND TSS THRESHOLD LEVELS WILL BE DEVELOPED AND NEGOTIATED WITH NYSDEC BASED ON THIS DATA. REAL TIME TURBIDITY READINGS FROM WITHIN THE WORK AREA, OUTSIDE THE SILT CURTAINS, WILL BE COMPARED TO THE BACKGROUND. IF THE TURBIDITY WITHIN THE WORK AREA, OUTSIDE THE SILT CURTAINS, EXCEEDS THE AGREED UPON THRESHOLD OVER THE BACKGROUND VALUES, WATER COLUMN SAMPLES WILL BE COLLECTED FROM THE BACKGROUND AREA AND WORK AREA FOR ON-SITE ANALYSIS OF TSS CONCENTRATION. IF THE TSS VALUE OF THE WORK AREA EXCEEDS BACKGROUND, WORK MUST HALT AND CORRECTIVE ACTION TAKEN TO MITIGATE SEDIMENT MIGRATION PRIOR TO RESUMING WORK. SHOULD SHEENS OR SLICKS BE OBSERVED OUTSIDE THE AREA OF THE BOOMS, THE COAST GUARD SHALL BE NOTIFIED, WORK WILL BE STOPPED, AND CORRECTIVE ACTION MUST BE TAKEN PRIOR TO RESUMING WORK. FURTHERMORE, ALL WORK CONDUCTED WITHIN THE RIVER SHALL BE COMPLETED IN ACCORDANCE WITH SECTION 10 AND SECTION 404 PERMITS AND NATIONWIDE PERMIT (NWP) NO. 38. THESE PERMITS WILL BE OBTAINED BY NATIONAL GRID OR THEIR REPRESENTATIVE PRIOR TO WORK.
12. THE CONTROL MEASURES TO BE USED DURING THE PROJECT ARE SUMMARIZED BELOW:
   A. SILT FENCE: SILT FENCE WILL BE INSTALLED AROUND SOIL STOCKPILES WHERE ROADWAY CUT/FILL SLOPES ARE LOCATED WITHIN 100 FEET OF A WATERCOURSE; AT UTILITY LINE STREAM CROSSINGS; AT CULVERT INSTALLATIONS; BETWEEN WETLAND BOUNDARIES AND CONSTRUCTION AREAS.
   B. HAY BALES: HAY BALES WILL BE INSTALLED AROUND SOIL STOCKPILES TO PREVENT SEDIMENTS FROM LEAVING THE STOCKPILE AREA.
   C. MULCHING: MULCHING WILL BE USED AS A TEMPORARY EROSION CONTROL MEASURE IN AREAS OF DISTURBANCES AND IN CONJUNCTION WITH SEEDING.
   D. STABILIZED CONSTRUCTION ENTRANCE: A STABILIZED CONSTRUCTION ENTRANCE WILL BE CONSTRUCTED WHENEVER AN ACCESS ROAD FROM THE CONSTRUCTION SITE INTERSECT WITH A LOCAL/COUNTY ROAD.
   E. ABSORBENT BOOMS: ABSORBENT BOOMS WILL BE INSTALLED ALONG THE WATER SIDE IN ORDER TO PREVENT MOVEMENT OF SHEENS OR LNAPL DOWNSTREAM.
   F. TURBIDITY CURTAINS: TURBIDITY CURTAINS WILL BE INSTALLED ALONG THE WATER SIDE IN ORDER TO PREVENT MOVEMENT OF SUSPENDED MATERIAL DOWNSTREAM.
   G. CHECK DAMS: TEMPORARY CHECK DAMS WILL BE CONSTRUCTED ALONG SWALES AND WITHIN CHANNELS TO RETARD THE VELOCITY OF FLOWING WATER AND TO TRAP LARGE PARTICLES PRIMARILY SANDS AND LARGE SILTS. THE CHECK DAMS WILL BE COMPRISED OF HAY OR STRAW BALES, GRAVEL OR ROCK. THE DAMS CAN ALSO BE USED IN BARREN AREAS TO REMOVE LARGE PARTICLE SEDIMENTS PRIMARILY SANDS AND LARGER SILTS.
   H. DIVERSION BERMS AND CONVEYANCE CHANNELS: DIVERSION BERMS INTERCEPT AND DIVERT RUNOFF WATER IN PROPERLY DESIGNED CONVEYANCE CHANNELS, HENCE DIVERTING THE RUNOFF AWAY FROM DISTURBED AREAS. IF REQUIRED FOR THIS PROJECT, THE LOCATION OF ADDITIONAL BERM/DIKE WILL BE IDENTIFIED BY THE CONTRACTOR.
   I. SLOPE DRAINS: SLOPE DRAINS ARE TYPICALLY INSTALLED AT DISTURBED SLOPES WHICH ARE EXPOSED TO EROSION. THEY ARE INSTALLED AT THE TIME THE SLOPE IS ADDED AND REMAIN UNTIL THE SLOPE IS PERMANENTLY STABILIZED IF REQUIRED FOR THE PROJECT THE LOCATION OF SLOPE DRAINS WILL BE IDENTIFIED BY THE CONTRACTOR.
   J. VEGETATED BUFFERS: NATURAL VEGETATED SECTIONS ARE EFFECTIVE FOR POLLUTANT REMOVAL FROM LOW-VELOCITY FLOWING RUNOFF, AND CAN BE INSTALLED IN CONJUNCTION WITH LEVEL SPREADERS. IF REQUIRED FOR THE PROJECT, THE LOCATION OF VEGETATED BUFFERS WILL BE IDENTIFIED BY THE CONTRACTOR.
   K. EROSION CONTROL BLANKETS: EROSION CONTROL BLANKETS ARE TYPICALLY INSTALLED WHERE SLOPES ARE GREATER THAN 30 PERCENT.
   L. SEEDING: SEEDING IS USED FOR BOTH TEMPORARY AND PERMANENT MEASURES TO STABILIZE DISTURBED AREAS.
   M. RIPRAP APRON: THESE APRONS ARE TYPICALLY INSTALLED TO REDUCE RUNOFF VELOCITY.
13. CONSTRUCTION SEQUENCING FOR EROSION AND SEDIMENT CONTROL:
   A. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
   B. INSTALL SEDIMENT BARRIERS AT DOWN SLOPE AREAS OF ALL PROPOSED GRADING ACTIVITIES.
   C. INSTALL TURBIDITY CURTAIN AND ABSORBENT BOOM PRIOR TO WORK IN WATERWAY.
   D. LAND DISTURBANCE SHALL BE LIMITED TO ONLY THOSE AREAS THAT ARE NECESSARY FOR DEVELOPMENT. NO MORE THAN (5) FIVE ACRES OF UNPROTECTED SOIL SHALL BE DISTURBED AT ONE TIME WITH NYSDEC APPROVAL. PREVIOUS EARTHWORK SHALL BE STABILIZED BEFORE NEW AREAS ARE EXPOSED.
   E. CLEAR EXISTING TRESS AND VEGETATION FROM AREAS TO BE EXCAVATED AND FILLED. STRIP AND STOCKPILE SOIL IN DESIGNATED AREAS. ERECT SILT FENCE AROUND STOCKPILE.
   F. PROTECT ALL TREES THAT ARE TO REMAIN AND WHICH ARE NEAR CONSTRUCTION AREA. PROVIDE SNOW FENCING AROUND THE TREE TRUNK. PROVIDE SNOW FENCING AT THE DRIP LINE SURROUNDING TREE, OR TO MAINTAIN A MINIMUM DIAMETER OF 10 FT AROUND TREES.
   G. PERFORM NECESSARY EXCAVATION OR FILL OPERATIONS TO BRING SITE TO DESIRED SUBGRADE.
   H. IF CONSTRUCTION IS SUSPENDED OR COMPLETED ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED IMMEDIATELY.
   I. AFTER COMPLETION OF CONSTRUCTION, FINE GRADE AND SPREAD TOP SOIL ON ALL LAWN AREAS AND SEED WITH PERMANENT SEED MIX AS SPECIFIED ON CONSTRUCTION DRAWINGS.
   J. MAINTAIN ALL SEEDED AND PLANTED AREAS AS PER EROSION AND SEDIMENTATION CONTROL MAINTENANCE PLAN TO ENSURE STABILIZED VEGETATIVE COVER.
   K. DURING CONSTRUCTION, ALL STRUCTURES SHOULD BE INSPECTED WEEKLY AND AFTER EVERY RAIN EVENT.
14. EROSION AND SEDIMENTATION CONTROL MAINTENANCE PLAN A. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE IN PLACE AT THE END OF EACH WORKING DAY. THE CONTROL DEVICES WILL BE INSPECTED AND MAINTAINED AS PRESCRIBED BELOW.
   A. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF-PRODUCING RAINFALL, AND NO LESS THAN ONCE EVERY WEEK. ANY NECESSARY REPAIRS WILL BE MADE WITHIN 48 HOURS TO MAINTAIN ALL PRACTICES AS DESIGNED.
   B. SEDIMENT ACCUMULATIONS AT THE SILT FENCE WILL BE REMOVED WHEN THE DEPTH OF THE SEDIMENT AT THE SILT FENCE REACHES 0.5 FT. OR ONE-HALF OF THE DEVICE MEASURED HEIGHT, WHICHEVER ONE IS LOWER. REPAIRS WILL BE MADE WITHIN 48 HOURS TO THE FENCE TO MAINTAIN IT AS A BARRIER.
   C. THE STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT THE TRACKING OF SOIL OR SEDIMENTS ONTO PUBLIC RIGHT-OF-WAY OR ROADS. PERIODICALLY, THE ENTRANCE WILL BE TOP DRESSED WITH ADDITIONAL AGGREGATES TO MAINTAIN THE 6 INCH THICKNESS. ANY SEDIMENT WHICH IS SPILLED, DROPPED OR WASHED ONTO THE PUBLIC RIGHT-OF-WAY SHALL BE REMOVED AT THE END OF EACH WORKING DAY.
   D. EROSION CONTROL BLANKETS INSTALLED WILL BE INSPECTED AFTER EACH STORM EVENT. ANY REPAIRS SHOULD BE MADE TO PREVENT ANY FURTHER DAMAGE. REPAIRS SHOULD BE MADE WITHIN 48 HOURS.
   E. SEEDED AREAS WILL BE CHECKED FOR GERMINATION AND DAMAGE FROM STORMS. AREAS WILL BE RESEEDED AS NECESSARY TO REPAIR DAMAGE.
   F. ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL PRACTICES WILL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL MAINTENANCE AND REPAIR WILL BE CONDUCTED IN ACCORDANCE WITH THE PRACTICE SELECTED.
   G. ALL TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICE WILL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED, OR AFTER THE TEMPORARY PRACTICE IS NO LONGER NEEDED. TRAPPED SEDIMENT WILL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL OF PRACTICE OR VEGETATION WILL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE.
   H. ALL PERMANENT VEGETATIVE PRACTICES WILL BE AS SHOWN ON THE DRAWINGS.
15. INSPECTIONS
   NATIONAL GRID PERSONNEL OR A QUALIFIED REPRESENTATIVE SHALL CONDUCT AN ASSESSMENT OF THE SITE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND CERTIFY IN AN INSPECTION REPORT THAT THE APPROPRIATE EROSION AND SEDIMENT CONTROLS DESCRIBED IN THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND REQUIRED BY THE NYSDEC HAVE BEEN ADEQUATELY INSTALLED OR IMPLEMENTED TO ENSURE OVERALL PREPAREDNESS OF THE SITE FOR THE COMMENCEMENT OF CONSTRUCTION. FOLLOWING THE COMMENCEMENT OF CONSTRUCTION, SITE INSPECTIONS SHALL BE CONDUCTED BY THE QUALIFIED PROFESSIONAL AT LEAST EVERY 7-CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.

FOR BID

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	06/27/2014	UPDATE SIGN DETAIL AND NOTE 7	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed:	*BEC*
Checked:	*LJW*
Drawn:	*DTE*
Submitted By:	*JTF*
NY P.E. No.:	*73034*
Submittal Date:	06/27/2014

GEI Consultants Inc. P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

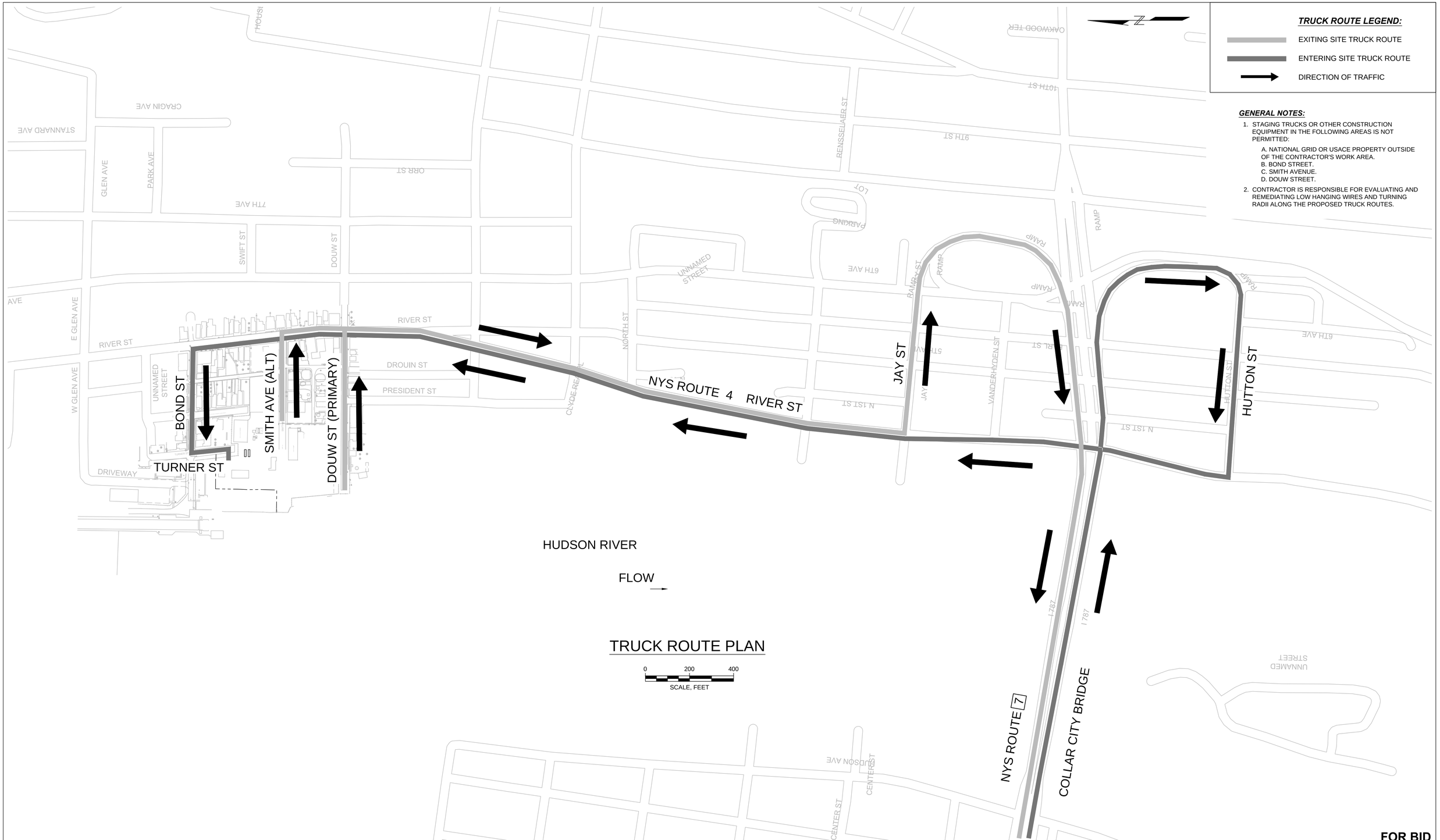
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

EROSION AND SEDIMENTATION NOTES & DETAILS

DWG. NO. C2

SHEET NO. 9 of 35



TRUCK ROUTE PLAN

0 200 400

SCALE, FEET

FOR BID

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STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

Designed:	BEC
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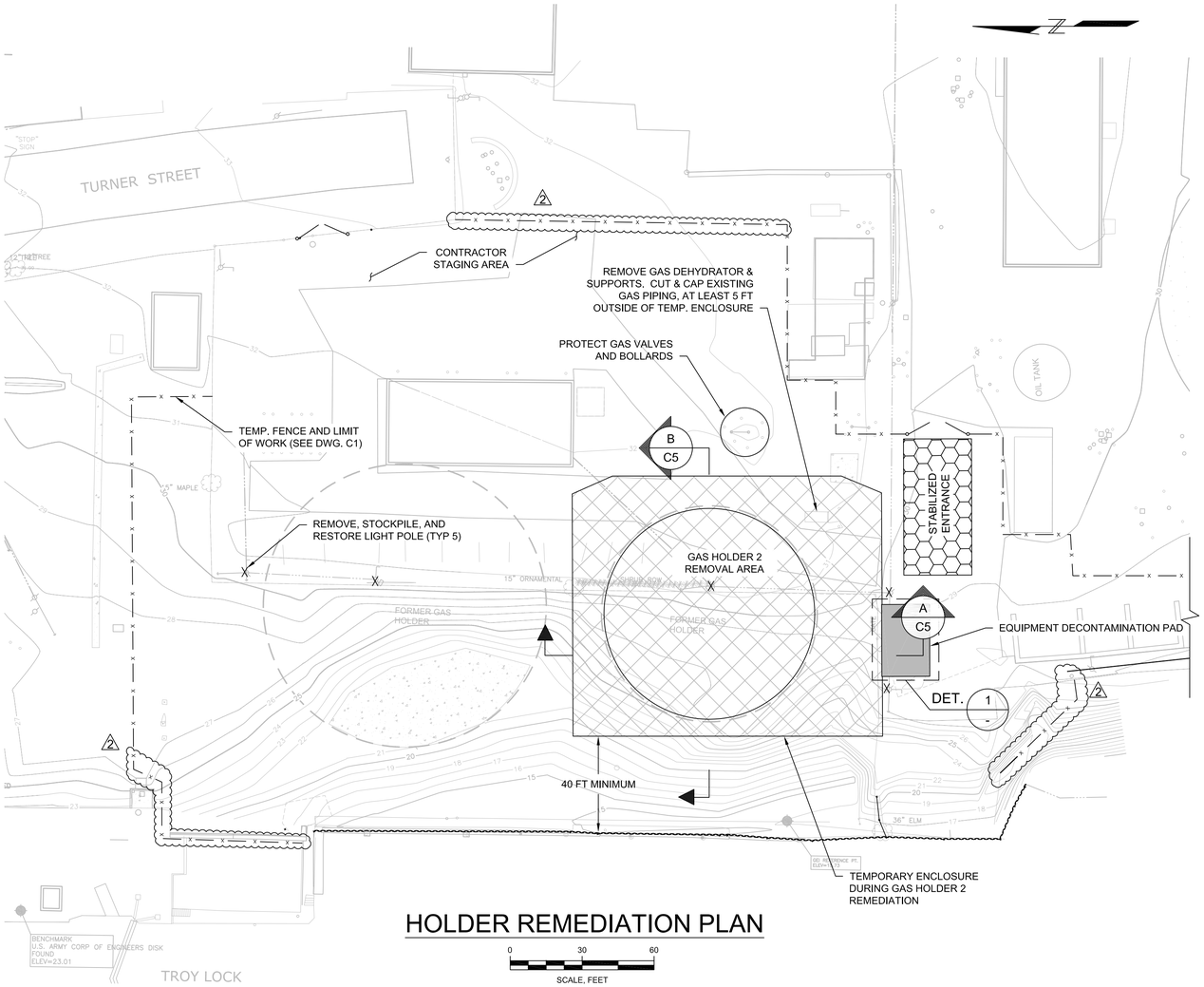
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

TRUCK ROUTE PLAN

DWG. NO. C3

SHEET NO. 10 of 35



HOLDER REMEDIATION PLAN

0 30 60

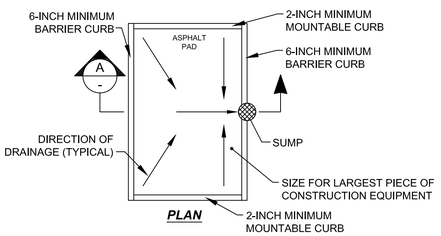
SCALE, FEET

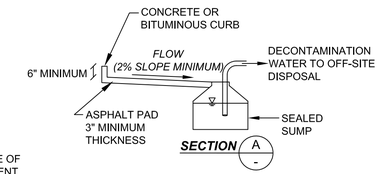
LEGEND:

- ANTI-TRACKING PAD
- DECONTAMINATION PAD
- TEMPORARY FENCE
- REMOVE AND RESTORE LIGHT POLE

NOTES:

1. THE CONTRACTOR SHALL PROVIDE A WORK PLAN DETAILING THE MEANS AND METHODS PLANNED FOR REMOVAL OF THE HOLDER CONTENTS FOR NATIONAL GRID REVIEW AND APPROVAL AT LEAST THREE WEEKS PRIOR TO START OF REMOVAL WORK.
2. CONTRACTOR SHALL CONDUCT ALL MGP HOLDER RELATED EXCAVATION OPERATIONS INSIDE A TEMPORARY ENCLOSURE. THE DIMENSIONS OF THE ENCLOSURE SHOWN ON THIS PLAN ARE APPROXIMATE. THE CONTRACTOR SHALL DESIGN THE ENCLOSURE TO ALLOW ALL MGP HOLDER RELATED EXCAVATION OPERATIONS TO BE CONDUCTED WITHIN THE ENCLOSURE.
3. CONTRACTOR SHALL DESIGN, INSTALL AND MAINTAIN THE TEMPORARY ENCLOSURE IN ACCORDANCE WITH THE NEW YORK BUILDING CODE. DETAILED DRAWINGS AND CALCULATIONS SHALL BE P.E. SEALED BY PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK.
4. CONTRACTOR SHALL REMOVE CONTENTS OF GAS HOLDER 2 AND DISPOSE OFFSITE, AT A FACILITY APPROVED BY NATIONAL GRID. DISPOSAL OF CONTAMINATED MATERIAL MUST BE AS PER NYSDEC REQUIREMENTS.
5. CONTRACTOR SHALL REVIEW AND EVALUATE EXISTING CONDITIONS TO DETERMINE THE TYPE OF EQUIPMENT AND SAFETY MEASURES NEEDED FOR PERFORMING EXCAVATION IN A SAFE MANNER.
6. THE TEMPORARY ENCLOSURE SHALL BE SELECTED BY THE CONTRACTOR AND APPROVED BY NATIONAL GRID.
7. CONTRACTOR SHALL BACKFILL THE HOLDER WITH EXCAVATED SUITABLE SOIL OR CLEAN FILL OBTAINED FROM AN OFFSITE SOURCE. ALL IMPORTED FILL MUST MEET REQUIREMENTS AS SPECIFIED IN NYSDEC REGULATIONS SUBPART 375-6.7(d).
8. ALL CONSTRUCTION EQUIPMENT AND TRANSPORTATION TRUCKS SHALL PASS THROUGH AN EQUIPMENT DECONTAMINATION PAD, TO BE CONSTRUCTED AS SHOWN ON DRAWINGS.
9. THE GAS HOLDER 2 WALL CONSISTS OF TWO CONCENTRIC BRICK RING WALLS, EACH THREE FEET THICK, WITH A CLAY LINER TWO FEET THICK BETWEEN THE BRICK WALLS. TEST PITS EXCAVATED AS PART OF THE REMEDIAL INVESTIGATION INDICATE THAT THE HOLDER WALLS ARE INTACT. THE CONTRACTOR SHALL EVALUATE THE STABILITY OF THE GAS HOLDER AS EXCAVATION OPERATIONS PROCEED, AND SHALL MAINTAIN THE INTEGRITY OF THE HOLDER WALLS. FURTHER INFORMATION REGARDING THE GAS HOLDER CAN BE FOUND IN THE GEOTECHNICAL REPORT INCLUDED AS PART OF THE DESIGN PACKAGE.
10. CONTRACTOR SHALL PROVIDE AN AIR HANDLING SYSTEM FOR ADEQUATE VENTILATION WITHIN THE ENCLOSURE SUCH THAT THE HEALTH, SAFETY AND WELFARE OF THE WORKERS AND THE SURROUNDING AREA ARE PROTECTED IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS, INCLUDING BUT NOT LIMITED TO:
    29 CFR 1910.120 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE
    29 CFR 1910.134 RESPIRATORY PROTECTION
    29 CFR 1910.1000 AIR CONTAMINANTS
    29 CFR 1910.1028 BENZENE
11. THE CONTRACTOR SHALL MONITOR THE ATMOSPHERE WITHIN AND SURROUNDING THE ENCLOSURE TO ENSURE THAT THE HEALTH, SAFETY AND WELFARE OF THE WORKERS WITHIN THE ENCLOSURE, AS WELL AS WORKERS IN THE SURROUNDING AREA ARE PROTECTED IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
12. THE EXHAUST FROM THE VENTILATION SYSTEM SHALL BE VENTED TO A TREATMENT SYSTEM (DESIGNED, PROVIDED AND OPERATED BY CONTRACTOR) PRIOR TO DISCHARGE TO THE ATMOSPHERE. THE VENTILATION AND AIR TREATMENT SYSTEM SHALL BE DESIGNED WITH REDUNDANCY SUCH THAT IT IS CAPABLE OF CONTINUOUS OPERATION (24 HOURS PER DAY WHILE THE ENCLOSURE IS ERECTED), INCLUDING DURING SYSTEM MAINTENANCE ACTIVITIES. THE VENTILATION SYSTEM SHALL ALSO BE DESIGNED SUCH THAT AIR SAMPLES MAY BE COLLECTED BY THE CONTRACTOR FROM THE TREATMENT SYSTEM'S INTAKE, EXHAUST AND INTERMEDIATE LOCATIONS. CONDUCT SAMPLING IN ACCORDANCE WITH THE NYSDEC WRITTEN APPROVAL FOR THE SYSTEM (TO BE OBTAINED BY CONTRACTOR). THE CONTRACTOR WILL BE REQUIRED TO CONTINUOUSLY OPERATE THE VENTILATION AND TREATMENT SYSTEM IN ACCORDANCE WITH ALL PROVISIONS OF THE NYSDEC APPROVAL.
13. CONTRACTOR SHALL REVIEW AND COMPLY WITH COMMUNITY AIR MONITORING PLAN (CAMP) PREPARED BY NATIONAL GRID.
14. APPROXIMATE OUTSIDE DIAMETER OF GAS HOLDER 2 = 90 FT. DEPTH OF GAS HOLDER VARIES.
15. HOLDER TO BE DEWATERED AS NECESSARY. WATER SHALL BE CONTAINERIZED FOR OFF-SITE DISPOSAL.
16. DEPTH, LOCATION, AND STATUS OF GAS LINES IS UNKNOWN. COORDINATE DECOMMISSIONING AND REMOVAL WITH NATIONAL GRID.





EQUIPMENT DECONTAMINATION PAD 1 -

NOT TO SCALE

FOR BID

NO.	DATE	ISSUE/REVISION	APP
2	08/25/2014	ADD 5. - UPDATE FENCING	JTF
1	06/27/2014	UPDATE NOTE 12	JTF
0	06/13/2014	FOR BID	JTF

Attention: 0 1" — If this scale bar does not measure 1" then drawing is not original scale.

STATE OF NEW YORK — JOHN T. FINN — 073034 — LICENSED PROFESSIONAL ENGINEER

Designed:	*BEC*
Checked:	*LJW*
Drawn:	*DTE*
Submitted By:	*JTF*
NY P.E. No.:	*73034*
Submittal Date:	06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

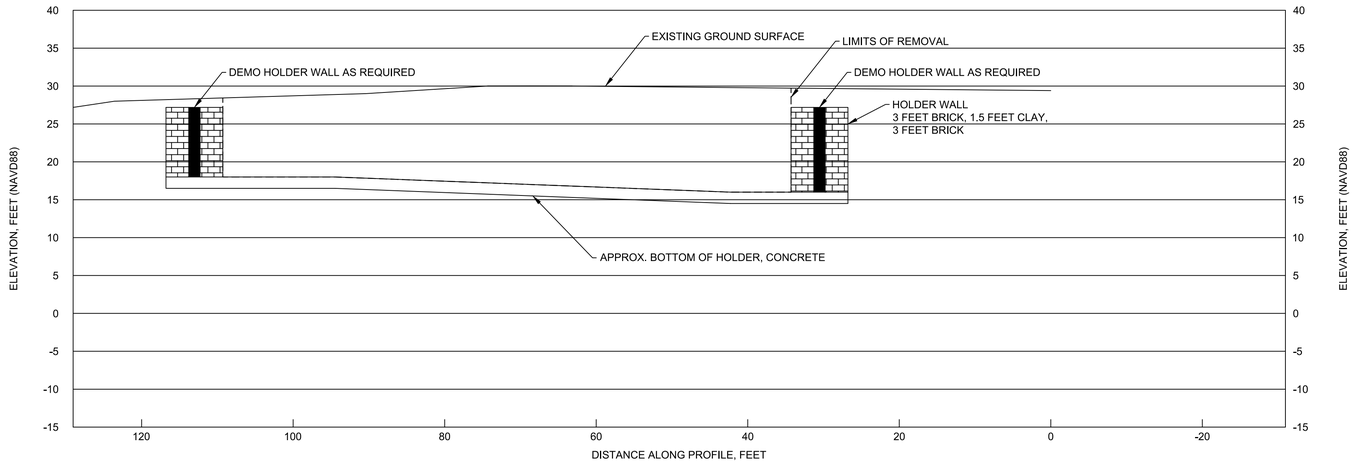
GAS HOLDER
REMEDIATION PLAN

DWG. NO. C4

SHEET NO. 11 of 35

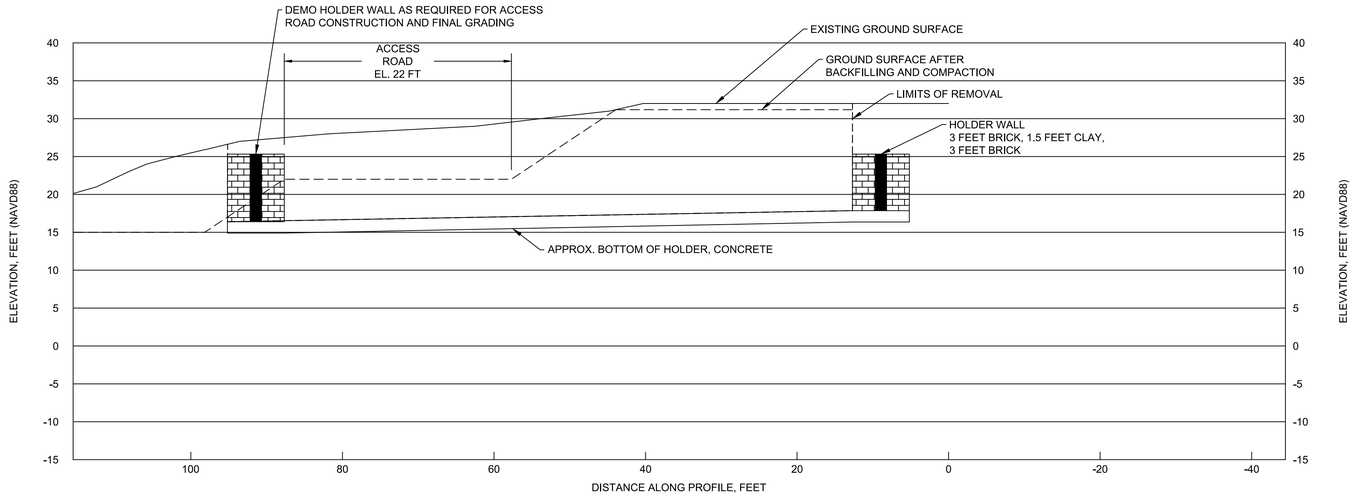
NOTES:

1. REFER TO GENERAL NOTES ON DWG. C4 FOR ADDITIONAL INFORMATION.



SECTION A
HOLDER EXCAVATION C4

0 10 20
SCALE, FEET



SECTION B
HOLDER EXCAVATION C4

0 10 20
SCALE, FEET

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
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STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed:	*BEC*
Checked:	*LJW*
Drawn:	*DTE*
Submitted By:	*JTF*
NY P.E. No.:	*73034*
Submittal Date:	06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

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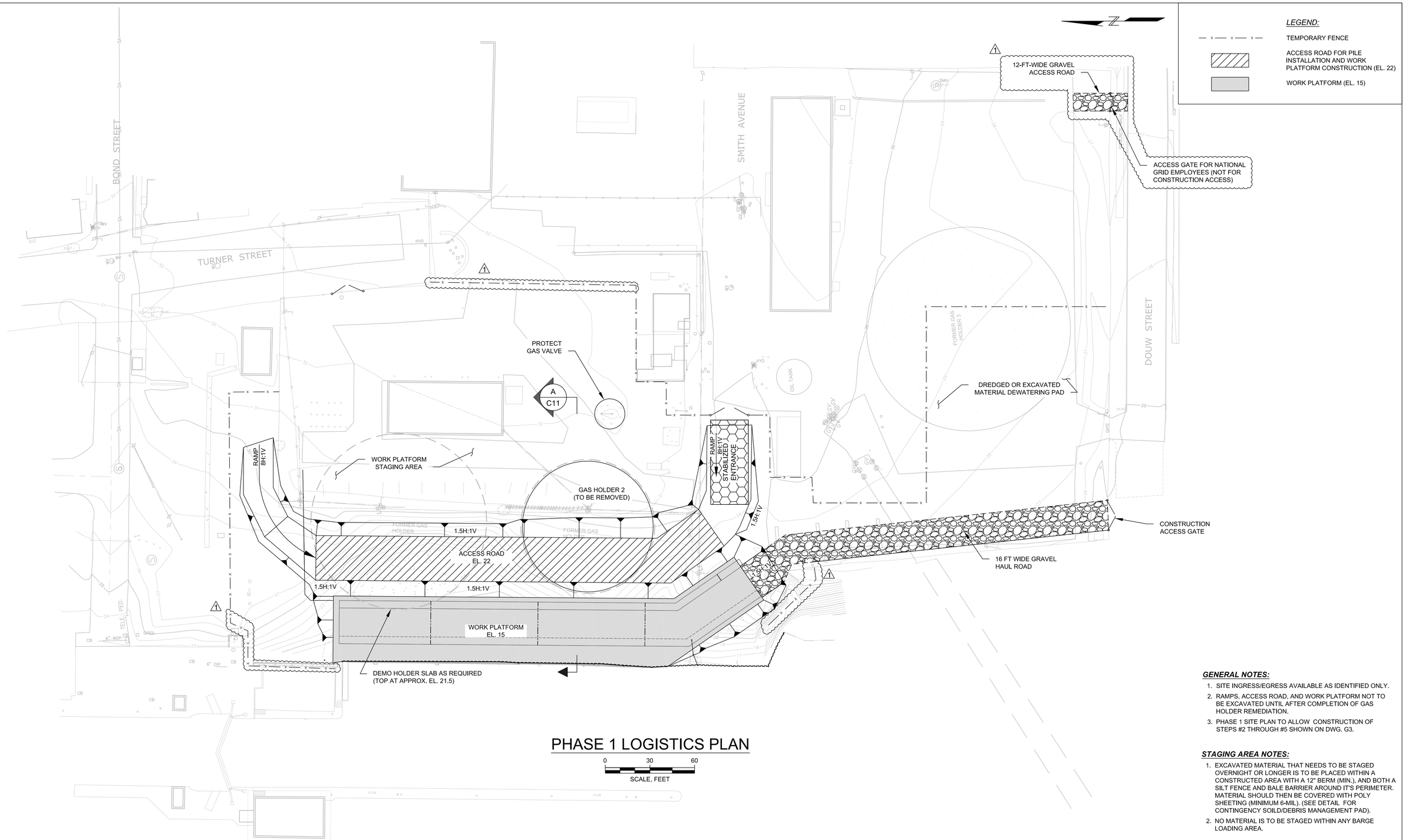
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

GAS HOLDER
REMEDIATION SECTIONS

DWG. NO. C5

SHEET NO. 12 of 35

\\th1v-fs01\Data\Tech\Project\National Grid\TROY SMITH AVE\CAD\DRAWINGS\Design\100% Submittal-Revision 1\11-12 - C4-C5 Gas Holder Remediation Plan and Section_Rev.1 8/4/2014



PHASE 1 LOGISTICS PLAN

0 30 60

SCALE, FEET

GENERAL NOTES:

1. SITE INGRESS/EGRESS AVAILABLE AS IDENTIFIED ONLY.
2. RAMPS, ACCESS ROAD, AND WORK PLATFORM NOT TO BE EXCAVATED UNTIL AFTER COMPLETION OF GAS HOLDER REMEDIATION.
3. PHASE 1 SITE PLAN TO ALLOW CONSTRUCTION OF STEPS #2 THROUGH #5 SHOWN ON DWG. G3.

STAGING AREA NOTES:

1. EXCAVATED MATERIAL THAT NEEDS TO BE STAGED OVERNIGHT OR LONGER IS TO BE PLACED WITHIN A CONSTRUCTED AREA WITH A 12" BERM (MIN.), AND BOTH A SILT FENCE AND BALE BARRIER AROUND IT'S PERIMETER. MATERIAL SHOULD THEN BE COVERED WITH POLY SHEETING (MINIMUM 6-MIL). (SEE DETAIL FOR CONTINGENCY SOILD/DEBRIS MANAGEMENT PAD).
2. NO MATERIAL IS TO BE STAGED WITHIN ANY BARGE LOADING AREA.

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - UPDATE FENCING	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed:	*BEC*
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Drawn:	*DTE*
Submitted By:	*JTF*
NY P.E. No.:	*73034*
Submittal Date:	06/13/2014

GEI Consultants Inc., P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

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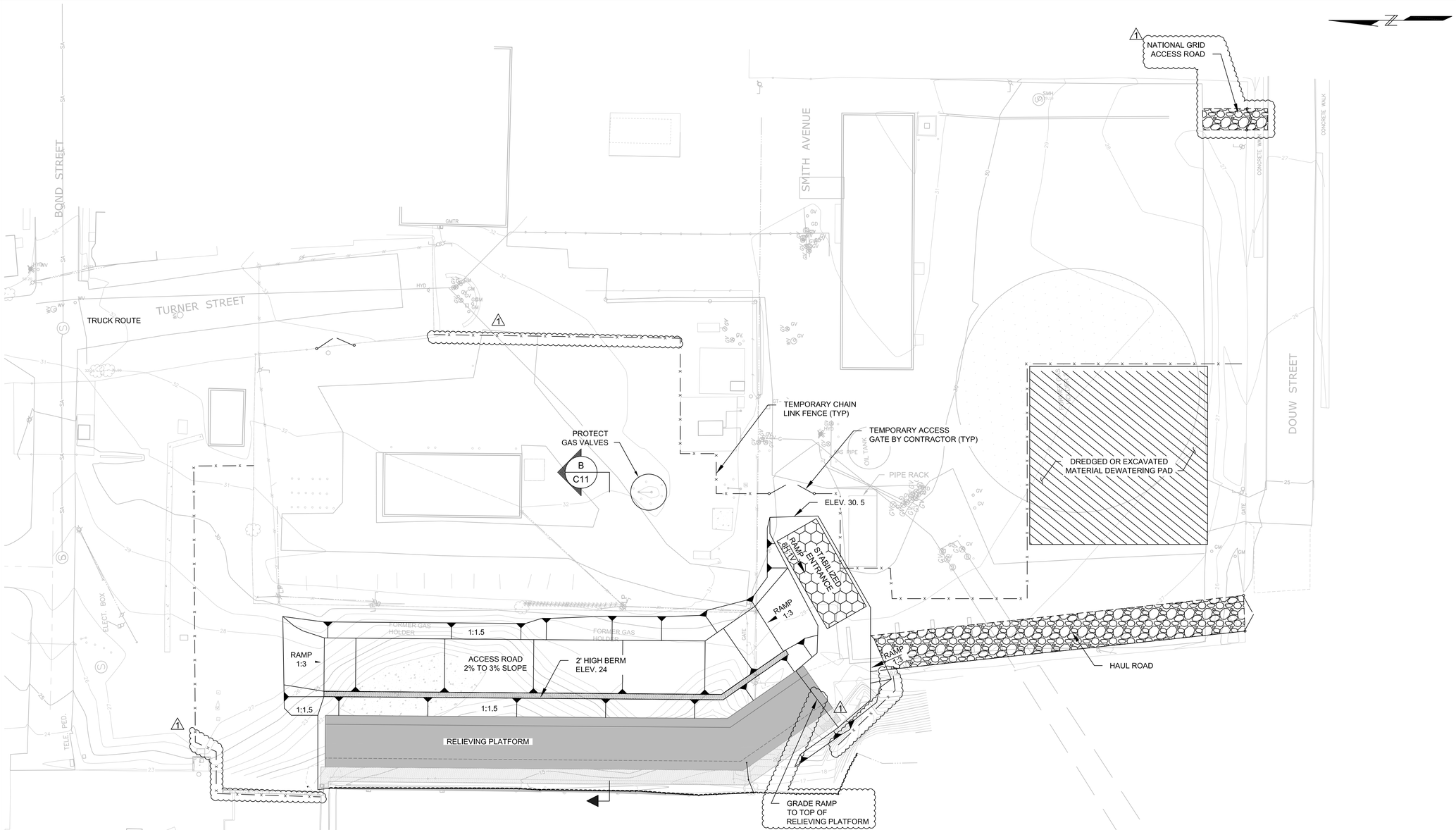
Operable Units No. 1 and 3

PHASE 1
SITE MANAGEMENT
AND LOGISTICS PLAN

DWG. NO. C6

SHEET NO. 13 of 35



PHASE 2 LOGISTICS PLAN

0 30 60

SCALE, FEET

LEGEND:

- ANTI-TRACKING PAD
- DECONTAMINATION PAD
- TEMPORARY FENCE
- LIMIT OF DREDGING
- FIXED TURBIDITY CURTAIN FOR DREDGING AND FILLING WITH ABSORBENT BOOM
- WORKING PLATFORM TO INSTALL SECANT PILES (ELEVATION VARIES AS SHOWN)
- BERM SLOPE

GENERAL NOTES:

1. SITE INGRESS/EGRESS AVAILABLE AS IDENTIFIED ONLY.
2. PHASE 2 SITE PLAN TO ALLOW CONSTRUCTION OF STEPS #6 THROUGH #15 SHOWN ON DWG. G3.
3. SECANT PILES AND DRILLED PILES NOT SHOWN FOR CLARITY.

STAGING AREA NOTES:

1. EXCAVATED MATERIAL THAT NEEDS TO BE STAGED OVERNIGHT OR LONGER IS TO BE PLACED WITHIN A CONSTRUCTED AREA WITH A 12" BERM (MIN.), AND BOTH A SILT FENCE AND BALE BARRIER AROUND ITS PERIMETER. MATERIAL SHOULD THEN BE COVERED WITH POLY SHEETING (MINIMUM 6-MIL). SEE DETAIL FOR CONTINGENCY SOILD/DEBRIS MANAGEMENT PAD.
2. NO MATERIAL IS TO BE STAGED WITHIN ANY BARGE LOADING AREA.

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
1	08/15/2014	ADD. 5 - UPDATE FENCING	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed:	*BEC*
Checked:	*LJW*
Drawn:	*DTE*
Submitted By:	*JTF*
NY P.E. No.:	*73034*
Submittal Date:	06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

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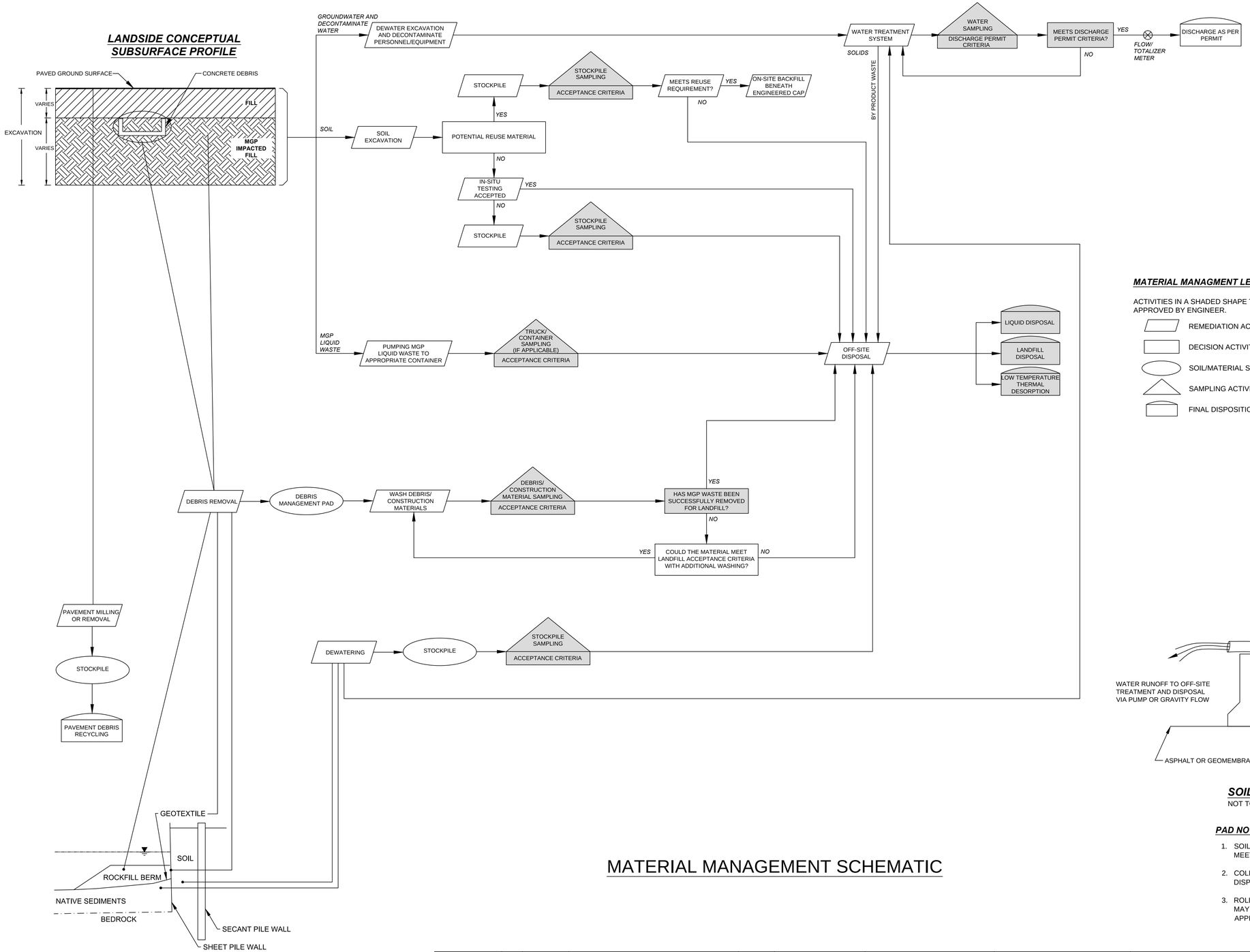
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

PHASE 2
SITE MANAGEMENT
AND LOGISTICS PLAN

DWG. NO. C7

SHEET NO. 14 of 35

\\mcf1v-fs01\Data\Tech\Projects\2011\11683-0 NG-Troy Smith Ave MGP\DWGS-GEI\DRAWINGS\Design\100% Submittal-Revision 1\14 - C7 Phase 2 Site Management and Logistics Plan_Rev.1 8/25/2014



MATERIAL MANAGEMENT SCHEMATIC

A. MATERIAL MANAGEMENT SCHEMATIC NOTES:

1. MGP LIQUID WASTE INCLUDES NAPL, TAR, AND ANY TYPE OF VISIBLY CONTAMINATED OR PUMPABLE PRODUCT THAT WAS GENERATED BY THE FORMER MGP.
2. PROPOSE TWO FACILITIES FOR EACH OFF-SITE DISPOSAL FACILITY TYPE FROM A LIST OF PRE-APPROVED FACILITIES PROVIDED BY NATIONAL GRID.
3. CONFIRM THAT OFF-SITE DISPOSAL FACILITIES HAVE SUFFICIENT CAPACITY (I.E. TONS OF SOILS PER DAY) TO SUPPORT PROPOSED EXCAVATION AND DREDGING RATES.
4. ENGINEER MAY MODIFY DISPOSITION OF SOIL AND DEBRIS BASED ON OBSERVATIONS DURING EXCAVATION TO A MORE STRINGENT CLASSIFICATION (I.E. RECLASSIFY MATERIAL SCHEDULED FOR NON-HAZARDOUS LANDFILL DISPOSAL TO THERMAL DESORPTION).
5. ENGINEER MAY MODIFY SOIL AND DEBRIS MANAGEMENT. MODIFICATIONS MAY INCLUDE STOCKPILING, ANALYTICAL TESTING, DIRECT LOADING, ETC.
6. STABILIZE, STAGE, AND CONTAINERIZE MGP LIQUID WASTE THAT IS NOT BOUND TO SOIL/MATERIAL MATRIX FOR OFF-SITE TRANSPORTATION. DO NOT DILUTE AND MIX WITH STOCKPILED SOIL.
7. USE LINED, WATERTIGHT, HAZARDOUS WASTE RATED CONTAINERS FOR OFF-SITE DISPOSAL OF MGP LIQUID WASTE.
8. COORDINATE FINAL DISPOSAL FACILITY ACCEPTANCE WITH NATIONAL GRID AND ENGINEER.
9. MANAGE INCIDENTAL EXCAVATIONS (PRE-TRENCHING, PRE-CUTTING, ETC.) IN ACCORDANCE WITH THE MATERIAL MANAGEMENT SCHEMATIC.
10. SEE CLEAN FILL NOTES FOR BORROW SOURCE EVALUATION.
11. ALL MATERIAL EXCAVATION WORK IS TO BE PERFORMED UNDER A MATERIAL MANAGEMENT PLAN PREPARED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.

MATERIAL MANAGMENT LEGEND:

ACTIVITIES IN A SHADED SHAPE TO BE PERFORMED AND/OR APPROVED BY ENGINEER.

- REMEDIATION ACTIVITY
- DECISION ACTIVITY
- SOIL/MATERIAL STOCKPILE
- SAMPLING ACTIVITY
- FINAL DISPOSITION

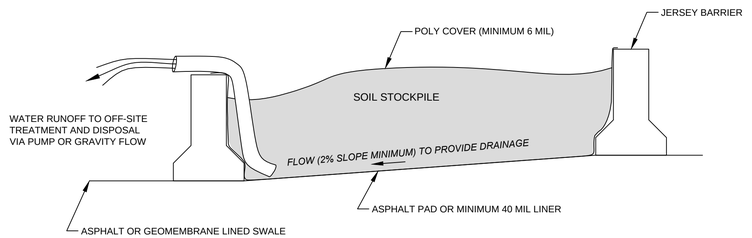
B. SOIL REUSE CRITERIA AND CLEANUP CRITERIA NOTES:

1. OBSERVATIONS AND ANALYTES:
   A. FREE OF VISIBLE MGP IMPACTS
   B. TOTAL PAHs < 500 ppm

   SOIL MAY BE CHARACTERIZED FROM SAMPLES TAKEN IN-SITU BY PRE-CHARACTERIZATION PROGRAM OR BY SAMPLES FROM STOCKPILED SOIL (BY CONTRACTOR).

2.

SAMPLE SOURCE	SAMPLE FREQUENCY
URBAN FILL	SEE NYSDEC
VISUALLY IMPACTED SOIL	DER-10 TABLE
DREDGED SEDIMENT	5.4(e)10.
WATER FROM EXCAVATION OR DECONTAMINATION	PER PERMIT



SOIL/SEDIMENT STOCKPILE PAD DETAIL (1) C1, C6, C7
NOT TO SCALE

PAD NOTES:

1. SOIL/DEBRIS STOCKPILE PAD DESIGN IS CONCEPTUAL. FINAL DESIGN WILL MEET THE INTENT OF THE CONCEPT AND BE APPROVED BY ENGINEER.
2. COLLECT ALL WATER FROM THE SOIL/DEBRIS PADS FOR TREATMENT AND DISPOSAL.
3. ROLLOFF CONTAINERS WITH AN ENTRAINED LIQUID COLLECTION SYSTEM MAY BE USED IN LIEU OF A STOCKPILE PAD, SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER.

FOR BID

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	06/27/2014	REVISE NOTES	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

Designed: CKT
Checked: JTF
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/27/2014

GEI Consultants Inc, PC.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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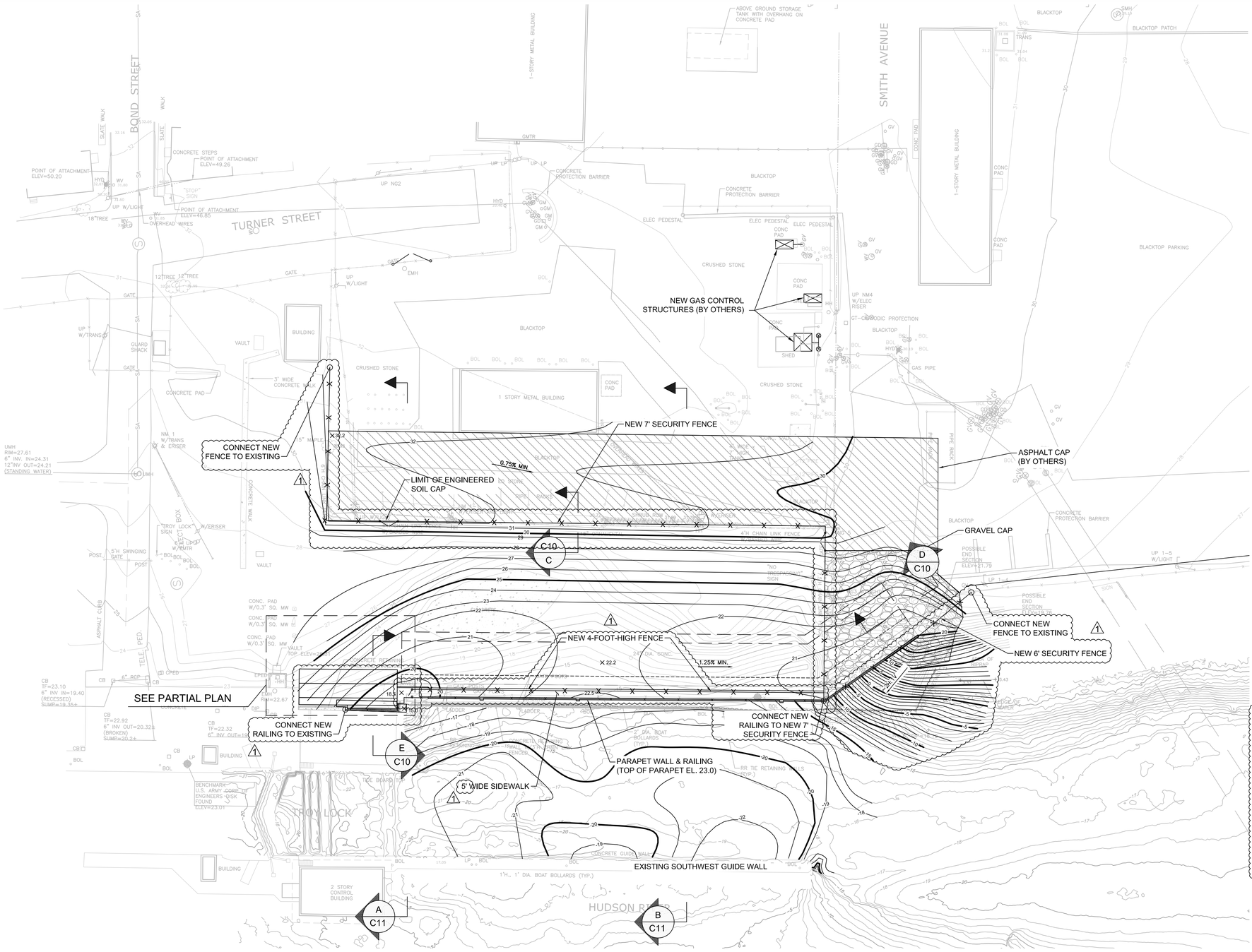
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

MATERIAL MANAGEMENT PLAN

DWG. NO. C8

SHEET NO. 15 of 35



0 30 60
SCALE, FEET

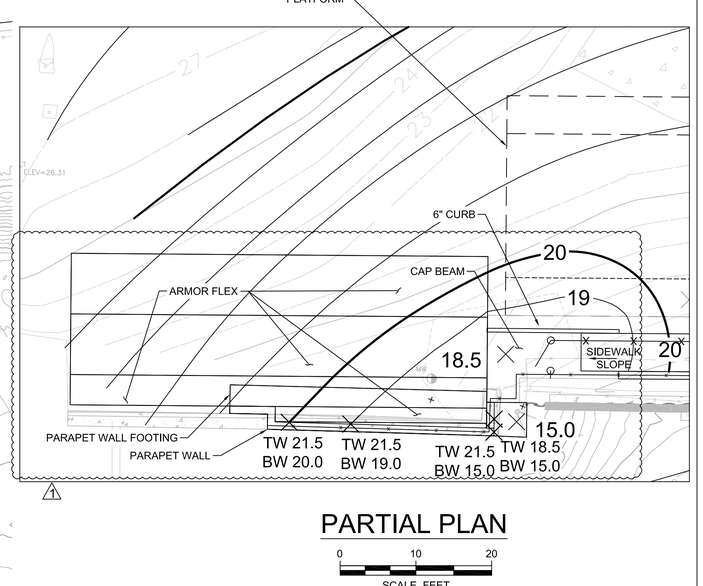
FINAL GRADING PLAN

LEGEND:

- ASPHALT CAP
- GRAVEL CAP
- 22 — PROPOSED GRADING CONTOUR

NOTES:

1. PROPOSED CLEAT LOCATIONS NOT SHOWN FOR CLARITY. SEE DRAWING S7 FENDER SECTION AND DETAILS FOR CLEAT LOCATIONS.
2. SEE DRAWING C13 FOR CHAIN LINK FENCE DETAILS.



PARTIAL PLAN

0 10 20
SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - GENERAL REVISIONS	JTF
0	06/13/2014	FOR BID	JTF

Attention:
0 1"
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STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed: STD/CBG
Checked: JTF
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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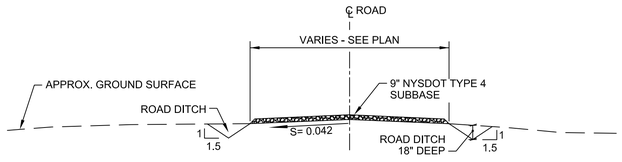
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

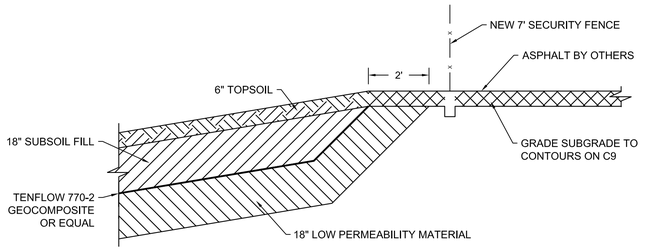
FINAL GRADING PLAN

DWG. NO. C9

SHEET NO. 16 of 35

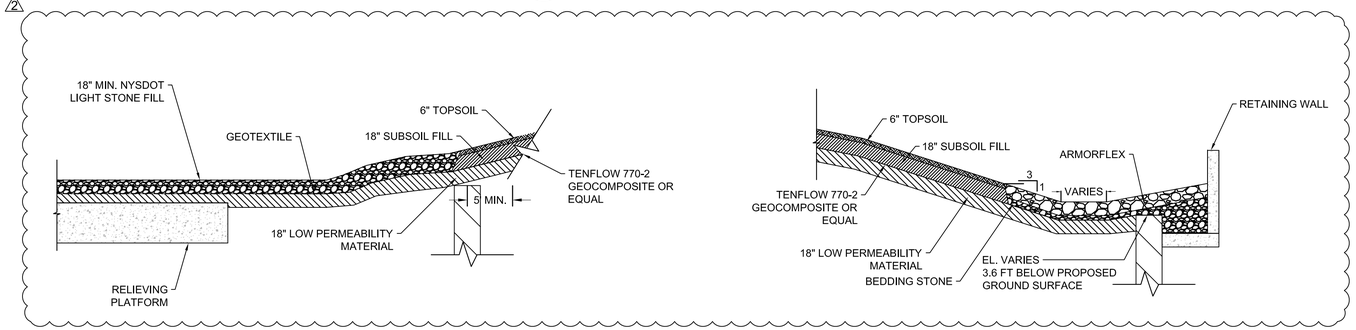


TYPICALSECTION
ACCESS/HAUL ROAD
NOT TO SCALE



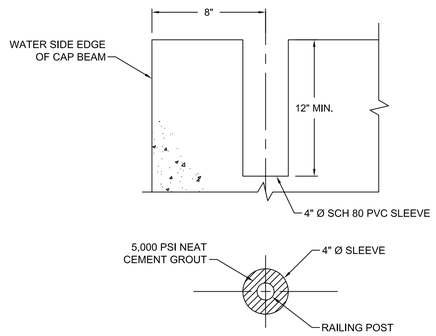
CAP AT EAST FENCELINE (C / C9)
NOT TO SCALE

△2



CAP AND SWALE AT SOUTH APRON (D / C9)
NOT TO SCALE

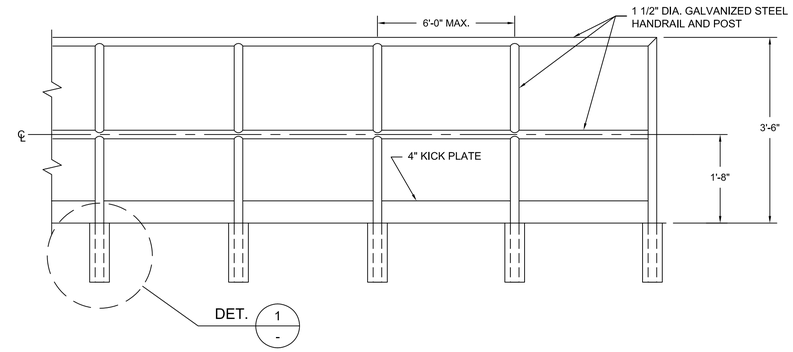
CAP AND SWALE AT NORTH APRON (E / C9)
NOT TO SCALE



TYPICAL DETAIL
HANDRAIL AND FENCE POST SUPPORT CONNECTION
NOT TO SCALE

NOTES:

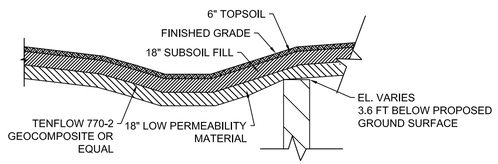
1. ADJUST PLAN LOCATIONS AND SLEEVES TO AVOID CORE BEAMS.
2. CAP BEAM REINFORCING NOT SHOWN FOR CLARITY.
3. GROUT STEEL POST INTO PVC SLEEVE AS SHOWN.



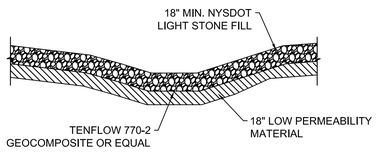
TYPICAL DETAIL
HANDRAIL WITH KICK PLATE
NOT TO SCALE

NOTE:

1. RAILING TO BE DESIGNED IN ACCORDANCE WITH OSHA STANDARDS BY CONTRACTOR.



TYPICAL SECTION
SOIL CAP
NOT TO SCALE



TYPICAL SECTION
GRAVEL CAP
NOT TO SCALE

FOR BID

NO.	DATE	ISSUE/REVISION	APP
2	08/25/2014	ADD. 5 - REVISE SECTIONS D & E	JTF
1	06/27/2014	UPDATE CAP DETAILS	JTF
0	06/13/2014	FOR BID	JTF

Attention: 0 1" — If this scale bar does not measure 1" then drawing is not original scale.

STATE OF NEW YORK — JOHN T. FINN — 073034 — LICENSED PROFESSIONAL ENGINEER

Designed: FS/CBG
Checked: WHW
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/27/2014

GEI Consultants Inc., P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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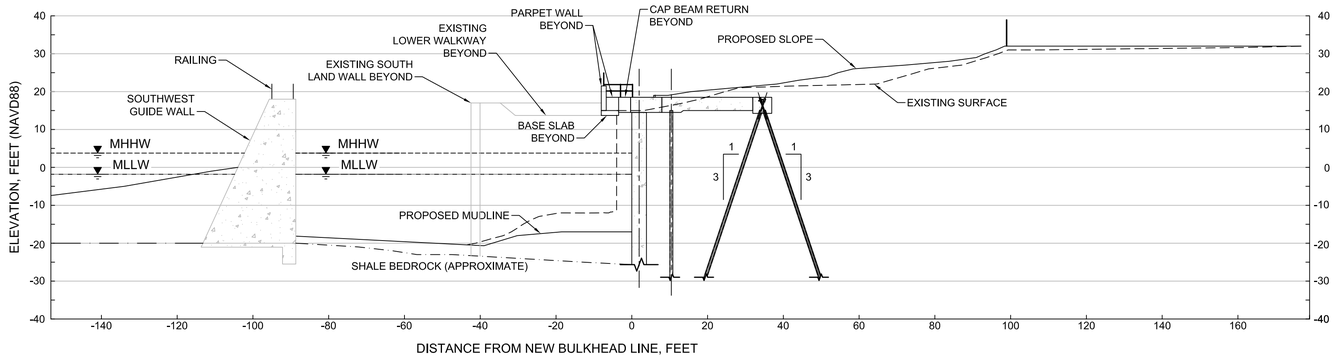
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

ENGINEERED SOIL CAP SECTIONS AND DETAILS

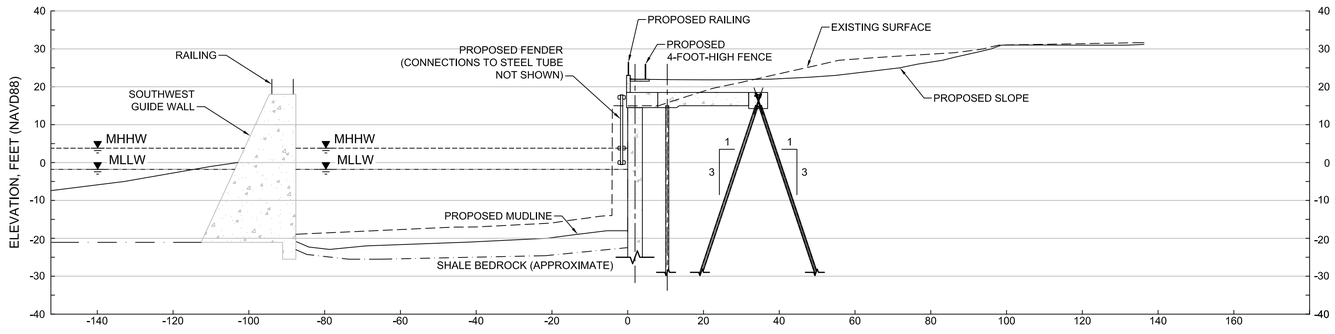
DWG. NO. C10

SHEET NO. 17 of 35



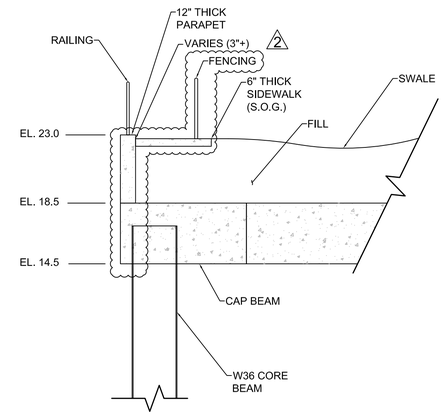
SECTION A / C9

SCALE: 1:20



SECTION B / C9

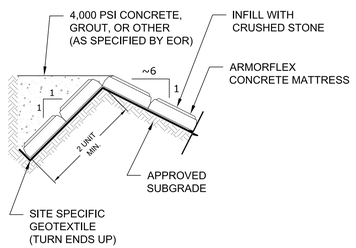
SCALE: 1:20



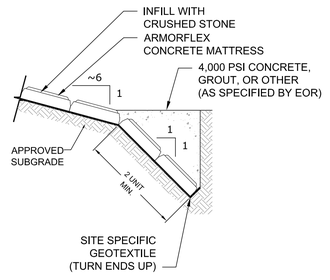
TYPICAL SECTION
GRADING AT PARAPET WALL
NOT TO SCALE

NOTES:

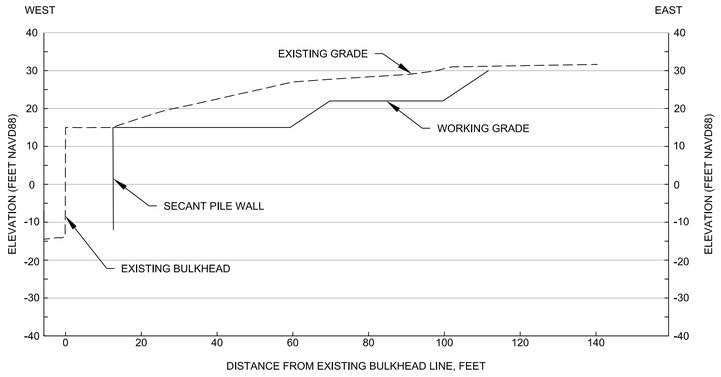
1. DESIGN ELEMENTS OF THE RELIEVING PLATFORM, BULKHEAD WALL, AND FENDER SYSTEM HAVE BEEN OMMITTED FOR CLARITY. DETAILS ARE INCLUDED IN THE S-SERIES DRAWINGS.



SECTION
NOT TO SCALE

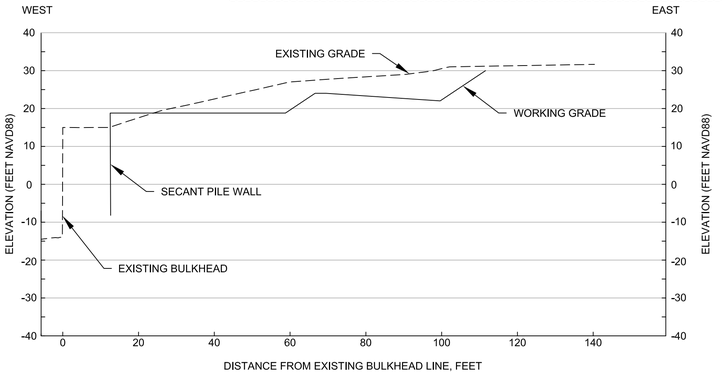


SECTION
NOT TO SCALE



SECTION - PHASE 1 A / C6

SCALE: 1:30



SECTION - PHASE 2 B / C7

SCALE: 1:30

FOR BID

NO.	DATE	ISSUE/REVISION	APP
2	08/25/2014	ADD. 5 - REVISE SECTIONS	JTF
1	08/05/2014	ADDENDUM 1 - REVISE SECTION B	JTF
0	06/13/2014	FOR BID	JTF

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STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

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Checked: JTF
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

FINAL CONDITIONS SECTIONS AND DETAILS

DWG. NO. C11

SHEET NO. 18 of 35

B101

GEI Consultants, Inc. 400 Winding Brook Road Glastonbury, CT 06033 (860) 368-5300

CLIENT: National Grid | BORING LOG
PROJECT: Troy (Smith Ave) MGP OU-1 PDI | B101
CITY/STATE: Troy, New York | PAGE 1 of 3
GEI PROJECT NUMBER: 11683-0

GROUND SURFACE ELEVATION (FT): 14.95 | LOCATION: North end of bulkhead
NORTHING: 1428025.63 | EASTING: 710932.8 | TOTAL DEPTH (FT): 59.50
DRILLED BY: Parratt-Wolff / J. Percy | DATUM VERT. / HORZ.: N/A / N/A
LOGGED BY: J. DeBellis | DATE START / END: 3/4/2013 - 3/8/2013
DRILLING DETAILS: Rotary wash / CME 850 Track Mounted Rig / Hammer: 140 lbs / Drop: 30 in. / Core Size: 2.405 in. / Core Type:
WATER LEVEL DEPTHS (FT): ▽ 11.88 3/7/2013 12:35 pm

DEPTH FT.	TYPE and NO.	PEN FT.	REC FT.	Blows (6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	G1	0.5	0.5						G1: SILTY SAND WITH GRAVEL (SM); ~75% fine to coarse sand, ~15% non plastic fines, ~10% fine gravel, dark brown. TOPSOIL.
	G2	0.5	0.5						G2: WIDELY GRADED SAND WITH GRAVEL (SW); ~55% fine to coarse sand, ~40% gravel to 3", ~5% non plastic fines, loose, moist, brown. FILL.
5	S1	2.0	0.8	6-8-16-6	0				S1: WIDELY GRADED SAND WITH GRAVEL (SW); ~65% fine to coarse sand, ~30% gravel to 3/4", ~5% non plastic fines, loose, brown. FILL.
	S2	2.0	0.7	12-14-14-9	0				S2: WIDELY GRADED SAND WITH GRAVEL (SW); Similar to S1. FILL.
	S3	2.0	1.0	12-12-20-15	0				S3: WIDELY GRADED SAND WITH GRAVEL (SW); Similar to S1. FILL.
10	S4	2.0	0.6	14-12-12-10	0				S4: WIDELY GRADED SAND WITH GRAVEL (SW); Similar to S1. FILL.
	S5	2.0	0.8	15-12-12-18	0				S5: WIDELY GRADED GRAVEL WITH SILT AND SAND (GW-GM); ~60% gravel to 1.4", ~30% fine to coarse sand, ~10% non plastic fines. OUTWASH.
15									
	S6	2.0	0.4	5-6-2-4	0				S6: NARROWLY GRADED SAND (SP); ~95% fine to medium sand, ~5% fines, black, 2" piece of gravel in bottom of shoe. OUTWASH.
20									
	S7	2.0	0.8	5-5-5-7	0				S7: NARROWLY GRADED SAND (SP); fine sand, black. OUTWASH.
25									
	S8	2.0	1.2	14-18-20-14	78				S8: NARROWLY GRADED SAND WITH GRAVEL (SP); ~85% medium to coarse, angular sand, ~15% gravel to 1", some shells, loose, dark gray; naphthalene-like odor, NAPL sheen and tar blebs. OUTWASH.
30									
	S9	2.0	1.2	13-17-15-13	0.1				S9: NARROWLY GRADED SAND WITH GRAVEL (SP); Similar to S8; slight naphthalene-like odor, some NAPL sheen. OUTWASH.
35									
	S10	2.0	0.5	32-15-34-37	0				S10: SILTY GRAVEL (GC-GM); ~37% fine to coarse sand, ~46% fine to coarse gravel, ~17% medium plasticity fines, dense, dark gray. Driller noted weathered shale bedrock in bottom of shoe. TILL.
40									
45	S11 / C1	0.1 / 4.9	0.1 / 4.8	50/1"					S11: WEATHERED SHALE BEDROCK; dark gray. C1: SHALE; medium hard, laminated, fine grained, well sorted, moderate to slight weathering, fractures spaced 1/2" to 6", fractures slightly weathered to fresh, gray to dark gray, 25°, 34° east at 21°, 51° east at 71. Beds dipping between 15 and 50°. Normanskill formation?
50	C2	3.0	2.8						C2: SHALE, medium hard, laminated, fine grained, well sorted, moderate to slight weathering, fractures spaced 1/2" to 4", fractures slightly weathered to fresh, gray to dark gray; 0°, 38° east at 3°, 46° east at 23°.
	C3	2.0	2.0						C3: SHALE, medium hard, laminated, fine grained, well sorted, moderate to slight weathering, fractures spaced 1" to 6", fractures slightly weathered to fresh, gray to dark gray; 0°, 25° east at 20° east at 14°. NAPL blebs, NAPL sheen in fractures.
55	C4	5.0	5.0						C4: SHALE, medium hard, laminated, fine grained, well sorted, moderate to slight weathering, fractures spaced 1/2" to 7.5", fractures slightly weathered to fresh, gray to dark gray; 48° east at 0°, 30° east at 31°. Thin calcite lens from 31° to 38°. NAPL blebs and sheen.

End of Boring at 59.5 feet.
Grouted with tremie pipe

NOTES:
PEN = PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC = RECOVERY LENGTH OF SAMPLE
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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET
NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
ALO = ASPHALT LIKE ODOR
CHLO = CHEMICAL LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR

B102A

GEI Consultants, Inc. 400 Winding Brook Road Glastonbury, CT 06033 (860) 368-5300

CLIENT: National Grid | BORING LOG
PROJECT: Troy (Smith Ave) MGP OU-1 PDI | B102A
CITY/STATE: Troy, New York | PAGE 2 of 3
GEI PROJECT NUMBER: 11683-0

GROUND SURFACE ELEVATION (FT): 15.7 | LOCATION: South end of bulkhead
NORTHING: 1427957.56 | EASTING: 710926.9 | TOTAL DEPTH (FT): 59.00
DRILLED BY: Parratt-Wolff / J. Percy | DATUM VERT. / HORZ.: N/A / N/A
LOGGED BY: J. DeBellis | DATE START / END: 3/11/2013 - 3/13/2013
DRILLING DETAILS: Rotary wash / CME 850 Track Mounted Rig / Hammer: 140 lbs / Drop: 30 in. / Core Size: 2.405 in. / Core Type:
WATER LEVEL DEPTHS (FT): ▽ 12.50 3/13/2013 3:10 pm

DEPTH FT.	TYPE and NO.	PEN FT.	REC FT.	Blows (6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0									
	S1	0.9	0.1	4-50/5"					S1: SILTY SAND (SM); ~65% fine to coarse sand, ~35% low to medium plasticity fines, brick fragments, moist, brown. FILL.
10	S2	2.0	0.3	11-9-9-8					S2: WIDELY GRADED GRAVEL WITH SAND (GW); ~55% fine to coarse, angular gravel, ~40% medium to coarse sand, ~5% low plasticity fines, saturated, brown. OUTWASH.
	S3	2.0	0.1	18-19-15-28					S3: WIDELY GRADED GRAVEL WITH SAND (GW); Similar to S2. OUTWASH.
15									
	S4	2.0	1.2	6-6-5-6	0				S4 (0"-5"): NARROWLY GRADED SAND (SP); fine sand, saturated, brown. OUTWASH. S4 (5"-14"): NARROWLY GRADED SAND (SP); fine sand, saturated, gray. OUTWASH.
20									
	S5	2.0	1.3	6-7-10-10	4.0				S5: WIDELY GRADED SAND (SW); ~95% mostly fine to medium sand, ~5% fine gravel. NAPL blebs, slight coating of reddish brown NAPL from 9" to 15", moderate hydrocarbon-like odor. OUTWASH.
25									
	S6	2.0	1.3	12-12-15-16	4.1				S6: WIDELY GRADED SAND WITH SILT (SW-SM); ~30% fine to coarse, subangular gravel, ~57% fine to coarse sand, ~7% low plasticity fines, saturated, dark gray. Moderate coating of reddish brown NAPL from 10" to 16", moderate naphthalene-like odor. OUTWASH.
30									
	S7	2.0	1.3	16-10-14-10					S7 (0"-13"): WIDELY GRADED GRAVEL WITH SAND (GW); Similar to S6. NAPL blebs and moderate sheen. OUTWASH. S7 (13"-16"): SANDY SILT (ML); ~60% low plasticity fines, ~40% fine to coarse sand, saturated, gray. TILL.
35									
	S8	1.9	0.8	16-20-25-50/4"					S8: SILTY SAND WITH GRAVEL (SM); ~50% fine to coarse, angular sand, ~30% non plastic fines, ~20% find to coarse gravel, saturated, gray. Weathered bedrock in shoe. TILL.
40	C1	4.0	2.5						C1 (0"-20"): SHALE, medium hard, laminated, fine grained, well sorted, severe weathering, fracture spacing 1/4" to 1/2", 1/2" clay layer at 20°, gray to dark gray. WEATHERED BEDROCK.
45	C2	4.0	4.0						C1: (20"-30") SHALE, medium hard, laminated, fine grained, well sorted, moderate weathering, fractures spaced 4" to 6", fractured slightly weathered to fresh gray to dark gray, dipping 40° east. Normanskill formation? C2: SHALE, medium hard, laminated, fine grained, well sorted, moderate to slight weathering, fractures spaced 4" to 17", fractures slightly weathered to fresh, gray to dark gray; dipping 32 to 43° east.
50	C3	5.0	5.0						C3: SHALE, medium hard, laminated, fine grained, well-sorted, moderate to slight weathering, fractures spaced 4" to 24", fractures slightly weathered to fresh, gray to dark gray; dipping 39 to 47° east.
55	C4	5.0	5.0						C4: SHALE, medium hard, laminated, fine grained, well-sorted, moderate to slight weathering, fractures spaced 1" to 8.5", fractures slightly weathered to fresh, gray to dark gray; dipping 34 to 41° east.

End of Boring at 59 feet.
Grouted with tremie pipe

NOTES:
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CHLO = CHEMICAL LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR

B103

GEI Consultants, Inc. 400 Winding Brook Road Glastonbury, CT 06033 (860) 368-5300

CLIENT: National Grid | BORING LOG
PROJECT: Troy (Smith Ave) MGP OU-1 PDI | B103
CITY/STATE: Troy, New York | PAGE 3 of 3
GEI PROJECT NUMBER: 11683-0

GROUND SURFACE ELEVATION (FT): 16.38 | LOCATION: South end of bulkhead
NORTHING: 1427881.93 | EASTING: 710919.1 | TOTAL DEPTH (FT): 54.00
DRILLED BY: Parratt-Wolff / M. Marshall | DATUM VERT. / HORZ.: N/A / N/A
LOGGED BY: B. Taylor | DATE START / END: 3/15/2013 - 3/19/2013
DRILLING DETAILS: Rotary wash / CME 850 Track Mounted Rig / Hammer: 140 lbs / Drop: 30 in. / Core Size: 2.405 in. / Core Type:
WATER LEVEL DEPTHS (FT): ▽ 12.98 3/19/2013

DEPTH FT.	TYPE and NO.	PEN FT.	REC FT.	Blows (6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0									G1: SILTY SAND WITH GRAVEL (SM); ~75% fine to coarse sand, ~15% fines, ~10% fine gravel, moist, dark brown. TOPSOIL. G2: WIDELY GRADED SAND WITH SILT AND GRAVEL (SW); ~65% fine to coarse sand, ~25% gravel to 2", ~10% fines, brick fragments, brown. FILL.
	S1	2.0	0.7	3-4-6-31	NM				S1: SILTY SAND (SM); ~80% fine to coarse sand, ~15% non plastic fines, ~5% fine to coarse, subangular gravel, dry to moist, brown. FILL.
5	S2	2.0	0.4	7-8-8-17	NM				S2: SILTY SAND (SM); Similar to S1. FILL.
	S3	2.0	0.7	5-6-14-14	NM				S3: WIDELY GRADED SAND WITH SILT (SW-SM); ~85% fine to coarse sand, ~10% non plastic fines, ~5% fine to coarse, subrounded gravel, concrete fragments, moist to wet, brown. FILL.
	S4	2.0	0.8	7-8-17-10	NM				S4: WIDELY GRADED SAND WITH SILT (SW-SM); ~80% fine to coarse sand, ~10% non plastic fines, ~10% fine to coarse subrounded gravel, concrete fragments, wet, brown. FILL.
10	S5	2.0	1.0	8-20-17-9	NM				S5: SILTY SAND (SM); ~75% fine to coarse sand, ~15% non plastic fines, ~10% fine to coarse subrounded gravel, wet, brown. FILL.
	S6	2.0	0.5	17-8-8-6	NM				S6: SILTY SAND (SM); ~70% fine to coarse sand, ~20% non plastic fines, ~10% fine to coarse subangular gravel, wet, light brown. OUTWASH.
15									
	S7	2.0	0.4	7-7-5-6	NM				S7: SILTY SAND (SM); ~70% fine to coarse sand, ~15% non plastic fines, ~15% fine to coarse subrounded gravel, wet, brown. OUTWASH.
20									
	S8	2.0	0.3	22-20-18-18	NM				S8: WIDELY GRADED GRAVEL WITH SAND (GW); ~80% subangular gravel, ~10% fine to coarse sand, wet, gray. OUTWASH.
25									
	S9	2.0	1.2	10-9-9-10	NM				S9 (0"-7"): WIDELY GRADED SAND WITH SILT (SW-SM); ~65% fine to coarse sand, ~10% non plastic fines, ~25% fine to coarse subrounded gravel, dark gray. OUTWASH. S9 (7"-14"): SILTY SAND (SM); ~84% fine sand; ~15% non plastic fines, wet, gray. OUTWASH.
30									
	S10	2.0	1.5	5-5-10-15	NM				S10 (0-12"): SILTY SAND (SM); Similar to S9 (7"-14"). OUTWASH. S10 (12"-18"): WIDELY GRADED SAND WITH SILT (SW-SM); ~65% fine to coarse sand, ~10% non plastic fines, ~5% fine to coarse subrounded gravel, wet, gray. TILL.
35	S11	0.3	0.3	50/3"					S11: NO RECOVERY.
	C1	5.0	4.2						C1: SHALE; medium hard, laminated, fine-grained, well-sorted, moderate weathering, fractures spaced between 1/4" to 8", fractures slightly weathered to fresh, few thin calcite lenses, gray to dark gray; dip 38 to 55° east.
40									
45	C2	5.0	5.0						C2: SHALE; medium hard, laminated, fine-grained, well-sorted, moderate to low weathered, fractures spaced between 1/4" and 8", fractures slightly weathered to fresh, gray to dark gray, few thin calcite lenses; dipping 32 to 47° east.
50	C3	5.0	5.0						C3: SHALE; medium hard, laminated, fine-grained, well-sorted, moderate to low weathered, gractures spaced between 1/8" and 4", fractures slightly weathered to fresh, gray to dark gray, few thin calcite veins, trace NAPL blebs.
55									

End of Boring at 54 feet.
Grouted with tremie pipe

NOTES:
PEN = PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC = RECOVERY LENGTH OF SAMPLE
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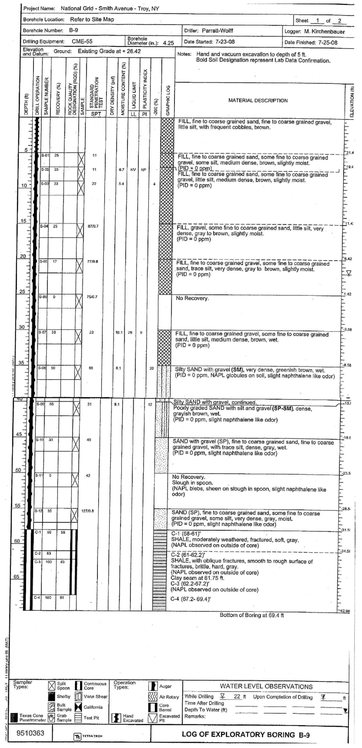
ALO = ASPHALT LIKE ODOR
CHLO = CHEMICAL LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR

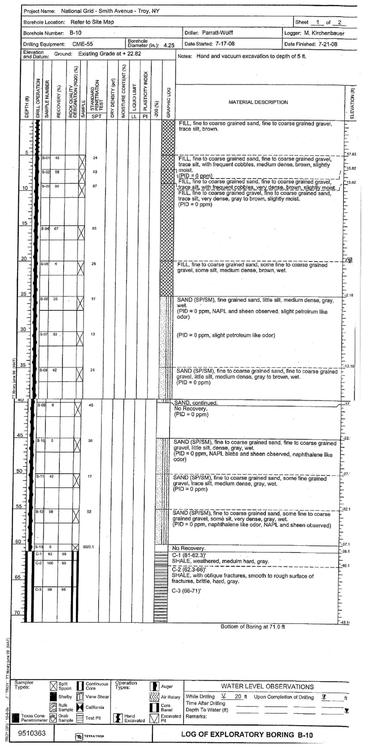
B-9

Project Name: National Grid - Smith Avenue - Troy, NY
Borehole Location: Refer to Site Map | Sheet 1 of 2
Borehole Number: B-9 | Driller: Parratt-Wolff | Logger: M. Kirchenbauer
Drilling Equipment: CME-55 | Borehole Diameter (in.): 4.25 | Date Started: 7-23-08 | Date Finished: 7-25-08
Elevation and Datum: Ground: Existing Grade at + 26.42
Notes: Hand and vacuum excavation to depth of 5 ft. Bold Soil Designation represent Lab Data Confirmation.


DEPTH (FT)
SAMPLE NUMBER
SAMPLE NUMBER
RECOVERY (%)
PID READING (ppm)
BLOW COUNTS (N VALUE)
SPT
DRY DENSITY (pcf)
MOISTURE CONTENT (%)
LIQUID LIMIT
PLASTICITY INDEX
GRAPHIC LOG
MATERIAL DESCRIPTION
ELEVATION (ft)
FILL, fine to coarse grained sand, fine to coarse grained gravel, little silt, with frequent cobbles, brown.
FILL, fine to coarse grained sand, some fine to coarse grained gravel, some silt, medium dense, brown, slightly moist. (PID = 2 ppm)
FILL, fine to coarse grained sand, some fine to coarse grained gravel, little silt, medium dense, brown, slightly moist. (PID = 0 ppm)
FILL, gravel, some fine to coarse grained sand, little silt, very dense, gray to brown, slightly moist. (PID = 0 ppm)
FILL, fine to coarse grained gravel, some fine to coarse grained sand, little silt, medium dense, gray to brown, slightly moist. (PID = 0 ppm)
No Recovery.
FILL, fine to coarse grained gravel, some fine to coarse grained sand, little silt, medium dense, brown, wet. (PID = 0 ppm)
Silty SAND with gravel (SM), very dense, greenish brown, wet. (PID = 0 ppm, NAPL globules on soil, slight naphthalene like odor)
Silty SAND with gravel, continued.
Poorly graded SAND with silt and gravel (SP-SM), dense, grayish brown, wet. (PID = 0 ppm, slight naphthalene like odor)
SAND with gravel (SP), fine to coarse grained sand, fine to coarse grained gravel, with trace silt, dense, gray, wet. (PID = 0 ppm, slight naphthalene like odor)
No Recovery. Slough in spoon, (NAPL blebs, sheen on slough in spoon, slight naphthalene like odor)
SAND (SP), fine to coarse grained sand, some fine to coarse grained gravel, some silt, very dense, gray, moist. (PID = 0 ppm, slight naphthalene like odor)
C-1 (58-61)
SHALE; moderately weathered, fractured, soft, gray. (NAPL observed on outside of core)
C-2 (61-62.27
SHALE, with oblique fractures, smooth to rough surface of fractures, brittle, hard, gray.
Clay seam at 61.75 (NAPL observed on outside of core)
Clay seam at 61.75
C-3 (62.2-67.2)
C-4 (67.2- 69.47
Bottom of Boring at 69.4 ft
Sampler Types: Split Spoon, Shelby, Bulk Sample, Grab Sample, Texas Cone Penetrometer, Continuous Core, Vane Shear, California, Test Pit, Hand Extruded
Operation Types: Auger, Air Rotary, Bore Rerner, Excavated
WATER LEVEL OBSERVATIONS
While Drilling ▽ 22 ft | Upon Completion of Drilling ▽ ft
Time After Drilling | Depth To Water (ft) | Remarks:
9510363 | TETRA TECH
LOG OF EXPLORATORY BORING B-9

B-10

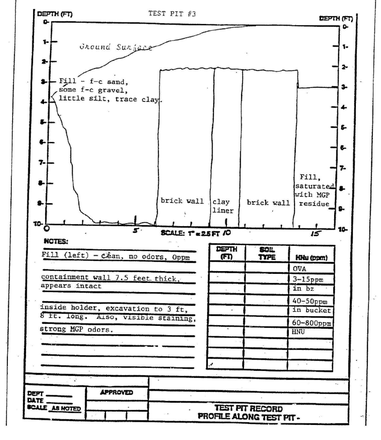
Project Name: National Grid - Smith Avenue - Troy, NY
Borehole Location: Refer to Site Map | Sheet 1 of 2
Borehole Number: B-10 | Driller: Parratt-Wolff | Logger: M. Kirchenbauer
Drilling Equipment: CME-55 | Borehole Diameter (in.): 4.25 | Date Started: 7-17-08 | Date Finished: 7-21-08
Elevation and Datum: Ground: Existing Grade at + 22.82
Notes: Hand and vacuum excavation to depth of 5 ft.


DEPTH (FT)
SAMPLE NUMBER
SAMPLE NUMBER
RECOVERY (%)
PID READING (ppm)
BLOW COUNTS (N VALUE)
SPT
DRY DENSITY (pcf)
MOISTURE CONTENT (%)
LIQUID LIMIT
PLASTICITY INDEX
GRAPHIC LOG
MATERIAL DESCRIPTION
ELEVATION (ft)
FILL, fine to coarse grained sand, fine to coarse grained gravel, trace silt, brown.
FILL, fine to coarse grained sand, fine to coarse grained gravel, trace silt, with frequent cobbles, medium dense, brown, slightly moist. (PID = 0 ppm)
FILL, fine to coarse grained sand, fine to coarse grained gravel, some silt, with frequent cobbles, very dense, brown, slightly moist.
FILL, fine to coarse grained sand, some fine to coarse grained gravel, some silt, medium dense, gray, slightly moist. (PID = 0 ppm)
FILL, fine to coarse grained sand, some fine to coarse grained gravel, some silt, medium dense, brown.
SAND (SP/SM), fine grained sand, little silt, medium dense, gray, wet. (PID = 0 ppm, NAPL and sheen observed, slight petroleum like odor)
(PID = 0 ppm, slight petroleum like odor)
SAND (SP/SM), fine to coarse grained sand, fine to coarse grained gravel, some silt, medium dense, gray to brown, wet. (PID = 0 ppm)
SAND, continued.
No Recovery. (PID = 0 ppm)
SAND (SP/SM), fine to coarse grained sand, fine to coarse grained gravel, little silt, dense, gray, wet. (PID = 0 ppm, NAPL blebs and sheen observed, naphthalene like odor)
SAND (SP/SM), fine to coarse grained sand, some fine grained gravel, trace silt, medium dense, gray, wet. (PID = 0 ppm)
SAND (SP/SM), fine to coarse grained sand, some fine to coarse grained gravel, some silt, very dense, gray, wet. (PID = 0 ppm, naphthalene like odor, NAPL and sheen observed)
No Recovery.
C-1 (61-62.3)
SHALE; weathered, medium hard, gray.
C-2 (62.3-66)
SHALE, with oblique fractures, smooth to rough surface of fractures, brittle, hard, gray.
C-3 (66-71)
Bottom of Boring at 71.0 ft
Sampler Types: Split Spoon, Shelby, Bulk Sample, Grab Sample, Texas Cone Penetrometer, Continuous Core, Vane Shear, California, Test Pit, Hand Extruded
Operation Types: Auger, Air Rotary, Bore Rerner, Excavated
WATER LEVEL OBSERVATIONS
While Drilling ▽ 20 ft | Upon Completion of Drilling ▽ ft
Time After Drilling | Depth To Water (ft) | Remarks:
9510363 | TETRA TECH
LOG OF EXPLORATORY BORING B-10

TP-3

Test Pit Record

TEST PIT #3



NOTES:
Fill (left) - clean, no odors, 0ppm
containment wall 7.5 feet thick, appears intact
inside holder, excavation to 3 ft, 6" lt. long. Also, visible staining, strong MGP odors.

DEPTH (FT)	SOIL TYPE	HNu (ppm)
		OVA
		3-15ppm
		in hr
		40-50ppm
		in bucket
		60-800ppm
		HNU

DEPT
DATE
SCALE AS NOTED
APPROVED
TEST PIT RECORD
PROFILE ALONG TEST PIT -

FOR BID

NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	JTF

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

STATE OF NEW YORK JOHN T. FINN 073058 LICENSED PROFESSIONAL ENGINEER

Designed: STD
Checked: JTF
Drawn: DTE
Submitted By: JTF
NY P.E. No.: 73034
Submittal Date: 06/13/2014

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

Warning:
It is a violation of Section 7209.2 of the New York State Education Law for any person, unless acting under the direction of a licensed professional engineer, to alter in any way plans, specifications, plats or reports to which the seal of a professional engineer has been applied. If an item bearing the seal of a professional engineer is altered, the altering engineer shall affix to the item his seal and the notation "Altered By" followed by his signature, the date, and a specific description of the alteration.

nationalgrid

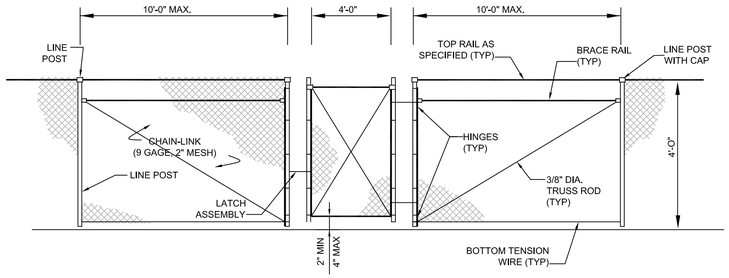
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

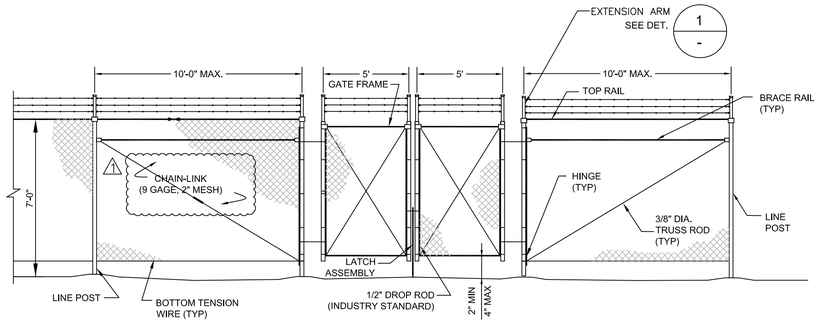
BORING LOGS

DWG. NO. C12
SHEET NO. 19 of 35

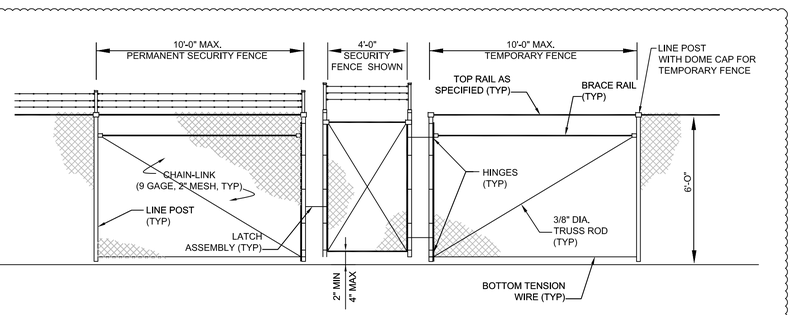
\\th1v-fs01\Data\Tech\Project\National Grid\TROY SMITH AVE\CAD\DRAWINGS\Design\100% Submittal-Revision 1\19 - C12 Boring Logs 8/4/2014



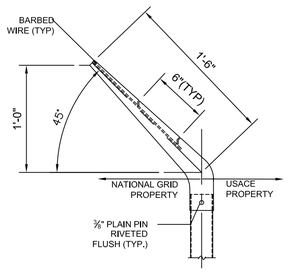
TYPICAL DETAIL
PERSONNEL GATE & 4 FT. FENCE



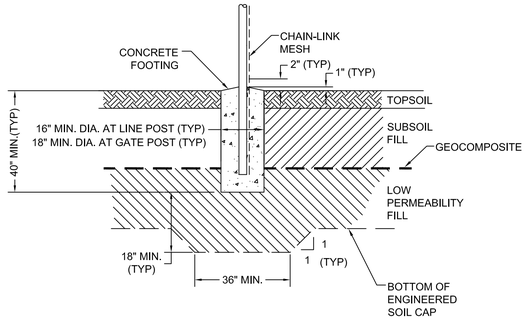
TYPICAL DETAIL
EQUIPMENT ACCESS GATE & 7 FT. SECURITY FENCE



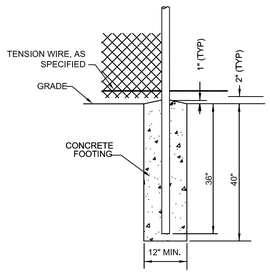
TYPICAL DETAIL
PERSONNEL GATE & 6 FT. SECURTY AND TEMPORARY FENCE



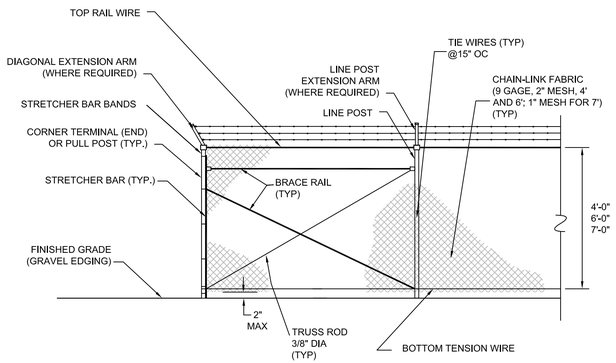
EXTENSION ARM DETAIL 1/-
NOT TO SCALE



TYPICAL DETAIL CHAINLINK FENCE POST IN SOIL CAP (FABRIC NOT SHOWN)
NOT TO SCALE



TYPICAL DETAIL CHAINLINK FENCE POST IN NATIVE SOIL
NOT TO SCALE



TYPICAL DETAIL FENCE CORNER/TERMINATION
NOT TO SCALE

POST DIAMETER IN INCHES			
TYPE	FABRIC HEIGHT (FT.)		
	4'	6'	7'
END, CORNER, PULL POSTS	2.375"	2.375"	2.875"
LINE POST	1.625"	1.875"	2.375"
TOP RAILS AND BRACE RAILS	1.66"	1.66"	1.66"
GATE POSTS	2.375"	2.375"	2.875"
NOTE: ALL FRAMEWORK TO BE ZINC COATED GROUP IA, HIGH STRENGTH GRADE (83,000 PSI) PER ASTM F-1043.			

FENCE NOTES:

1. SEE TYPICAL DETAIL ON C10 FOR POST CONNECTION IN CONCRETE.
2. WIRE TIES, RAILS, POSTS AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE OPPOSITE SIDE OF THE SECURE AREA.
3. SECURE FASTENING AND HINGE HARDWARE IN PLACE TO FENCE FRAMEWORK BY PEENING OR WELDING.
4. COAT PEENED OR WELDED AREAS WITH A REPAIR COATING MATCHING ORIGINAL COATING.
5. ALLOW FOR PROPER OPERATION OF COMPONENTS.
6. FOR FENCE SPECIFICATION SEE 32 31 10 FOR CHAIN-LINK FENCE AND GATES.

FOR BID

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - UPDATE FENCING DETAILS	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

Designed: *FS/CBG*
Checked: *WHW*
Drawn: *DTE*
Submitted By: *JTF*
NY P.E. No.: *73034*
Submittal Date: 06/13/2014

GEI Consultants Inc, P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

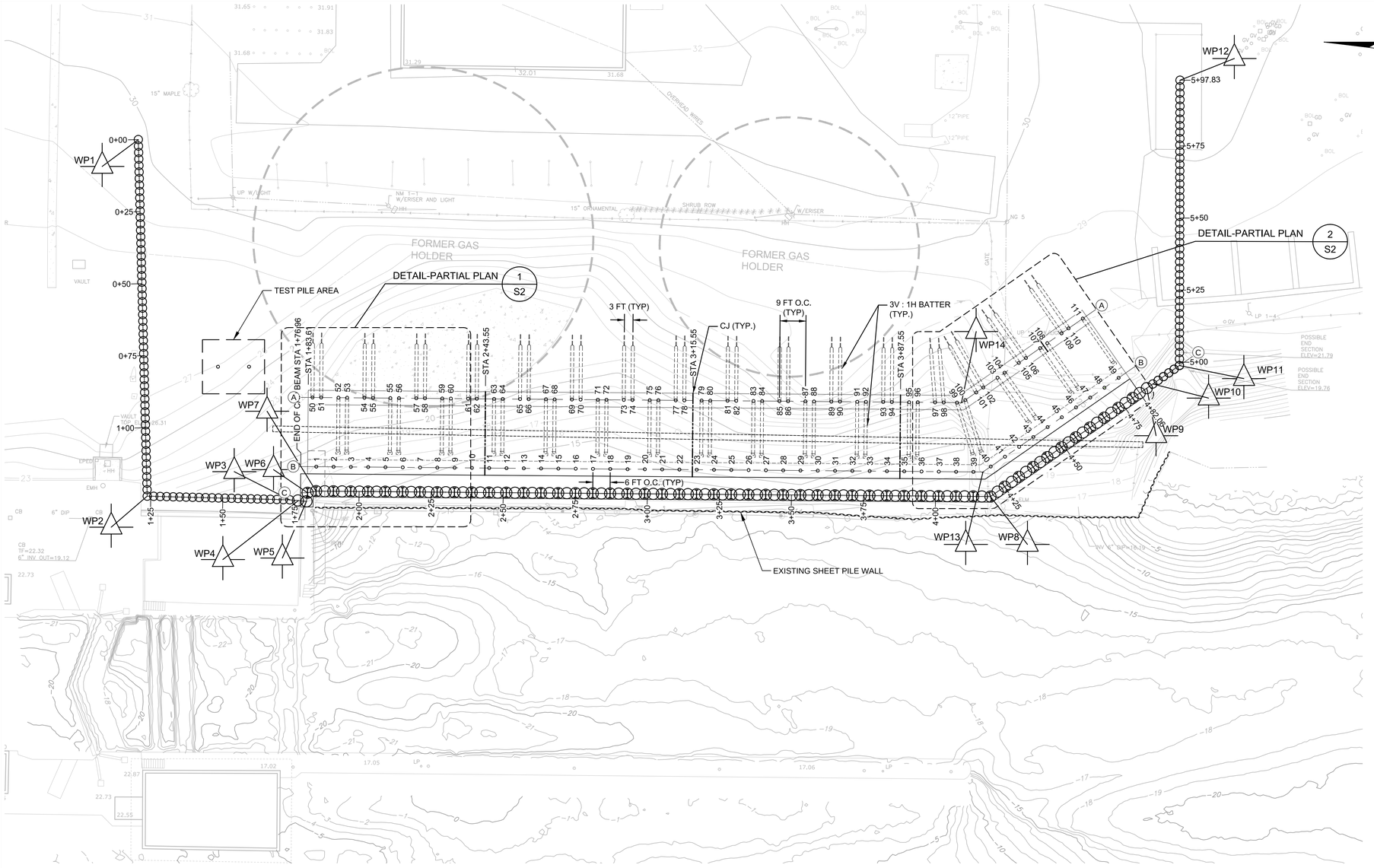
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

SECURITY FENCE SECTIONS AND DETAILS

DWG. NO. C13

SHEET NO. 20 of 35



PLAN

0 20 40

SCALE, FEET

LEGEND

XXX	PILE NUMBER
○	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI COMPRESSION MICROPILE WITH FULL FACE BIT
——○——	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI TENSION BATTERED MICROPILE (3H:1V) WITH FULL LENGTH TENSION GR 75 KSI #28 THREADED BAR
——◐——	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI COMPRESSION BATTERED MICROPILE (3H:1V) WITH FULL FACE BIT AND FULL LENGTH GR 75 KSI #28 THREADED BAR
Ⓐ	BATTER PILE ℄
Ⓑ	VERTICAL PILE ℄
Ⓒ	SECANT PILE ℄ AT RELEIVING PLATFORM

NOTES:

1. PARTIAL DEMOLITION OF CONCRETE MAT FOR FORMER NORTH SIDE GAS HOLDER REQUIRED. (1)
2. SEE DRAWING V2 FOR ELEVATION OF EXISTING BULKHEAD.
3. WORK PERFORMED ON THE SECANT PILES BETWEEN STA. 0+00 AND 2+00 SHALL BE PERFORMED FROM THE EAST SIDE OF THE WALL.
4. TEST PILE SHALL BE COMPLETED AND APPROVED PRIOR TO INSTALLATION OF PRODUCTION PILES.
5. TEMPORARY STABILITY BERM CONSTRUCTED BY OTHERS NOT SHOWN FOR CLARITY.

SECANT PILE WORK POINTS

POINT	STATION	NORTHING	EASTING
WP1	0+00	1428120.18	711057.20
WP2	1+23.75	1428129.67	710933.82
WP3	1+73.25	1428080.58	710927.52
WP4	1+76.26	1428077.61	710926.98
WP5	1+79.05	1428074.87	710926.41
WP6	1+82.05	1428074.19	710929.33
WP7	1+85.06	1428071.20	710929.58
WP8	4+19.06	1427838.61	710903.97
WP9	4+85.06	1427780.83	710935.88
WP10	4+87.58	1427778.63	710937.10
WP11	4+98.83	1427768.78	710942.53
WP12	5+97.83	1427758.54	711041.00

RELIEVING PLATFORM PILE WORK POINTS

PILE NUMBER	NORTHING	EASTING
1	1428070.27	710938.03
WP13	1427840.36	710912.71
46	1427805.95	710931.72
47	1428069.13	710962.05
WP14	1427845.30	710937.40
108	1427805.74	710959.25
109	1427800.49	710962.15

PILE INFORMATION

PILE NUMBER	INSTALLATION	SIZE	LOADING	BATTER	NOTES (1)
1 TO 49	DRILLED	9 5/8" DIA x 0.545"	COMPRESSION	NONE	GROUTED MICROPILE WITH PERMANENT CASING AND SACRIFICIAL BIT EXTENDING A MINIMUM OF 6 FEET INTO ROCK
50 TO 111 (32 PILES)	DRILLED	9 5/8" DIA x 0.545"	TENSION	1H : 3V	GROUTED MICROPILE WITH PERMANENT CASING EXTENDING A MINIMUM OF 4 FEET INTO ROCK; MINIMUM 8 INCH DIA. BY 15 FT. LONG ROCK SOCKET; FULL LENGTH, 75 KSI, EPOXY COATED, #28 THREADED BAR
50 TO 111 (31 PILES)	DRILLED	9 5/8" DIA x 0.545"	COMPRESSION	1H : 3V	GROUTED MICROPILE WITH PERMANENT CASING AND SACRIFICIAL BIT EXTENDING A MINIMUM OF 9 FEET INTO ROCK; FULL LENGTH, 75 KSI, EPOXY COATED, #28 THREADED BAR (1)

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - REVISE SOCKET LENGTHS	WHW
0	06/13/2014	FOR BID	WHW

STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed: FS/CG
Checked: WHW
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86268
Submittal Date: 06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

Warning:
It is a violation of Section 7209.2 of the New York State Education Law for any person, unless acting under the direction of a licensed professional engineer, to alter in any way plans, specifications, plats or reports to which the seal of a professional engineer has been applied. If an item bearing the seal of a professional engineer is altered, the altering engineer shall affix to the item his seal and the notation "Altered By" followed by his signature, the date, and a specific description of the alteration.

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GEI Project 116830

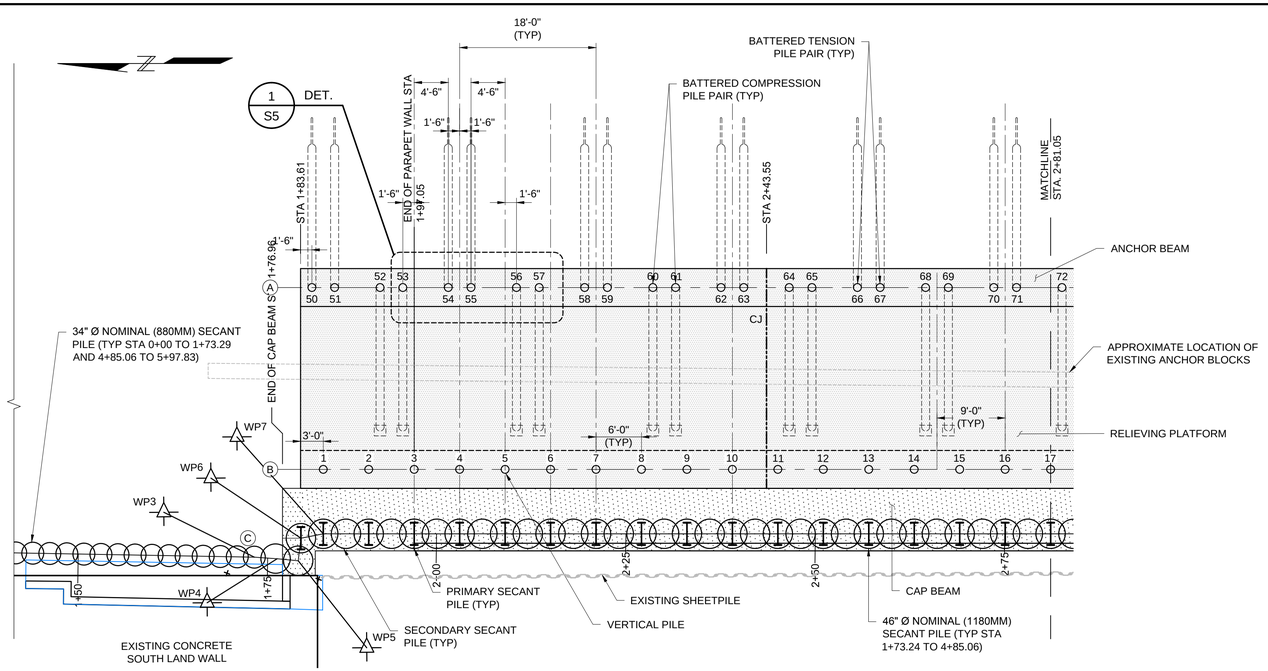
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

RELIEVING PLATFORM
PILING PLAN

DWG. NO. S1

SHEET NO. 21 of 35

\\th1v-fs01\Data\Tech\Project\National Grid\TROY SMITH AVE\CAD\DRAWINGS\Design\100% Submittal-Revision 1\21 - S1 Relieving Platform Piling Plan_Rev.1 8/21/2014



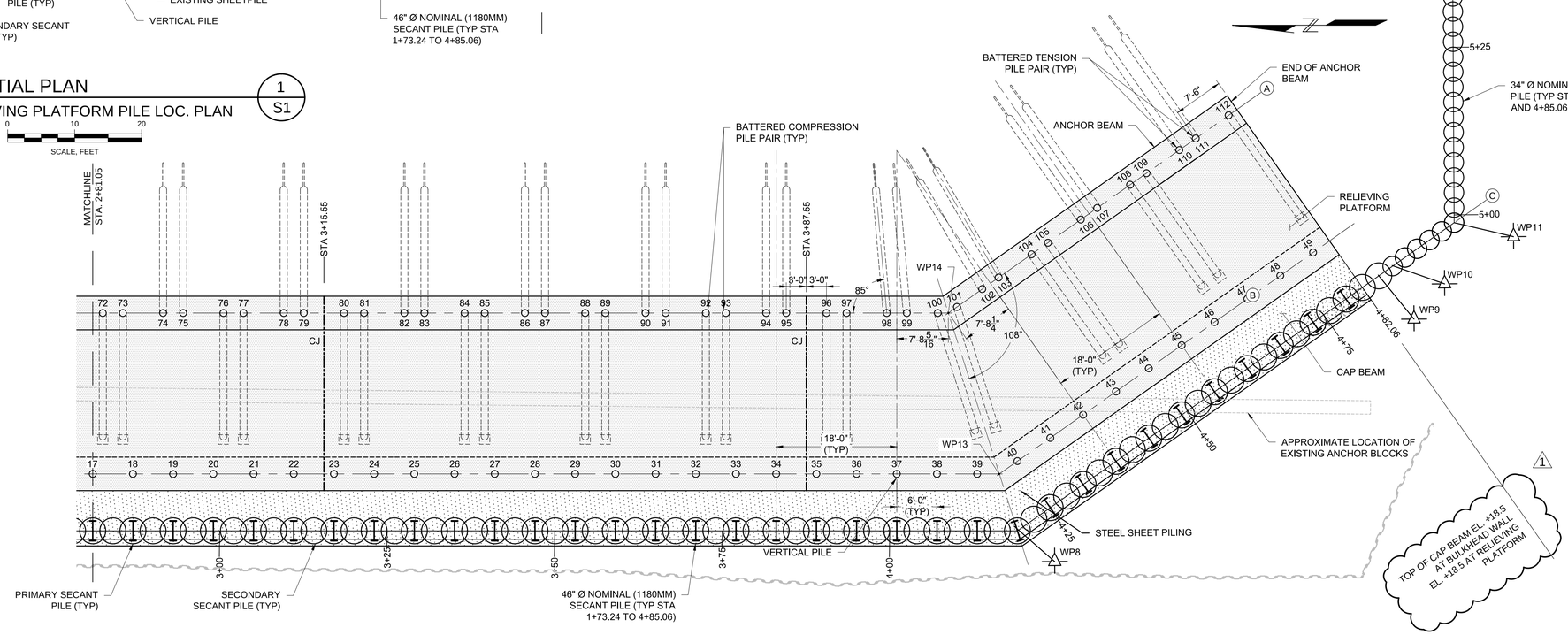
DETAIL-PARTIAL PLAN
TYPICAL RELIEVING PLATFORM PILE LOC. PLAN

1 / S1

0 10 20
SCALE, FEET

LEGEND

XXX	PILE NUMBER
○	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI COMPRESSION MICROPILE WITH FULL FACE BIT
	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI TENSION BATTERED MICROPILE (3H:1V) WITH FULL LENGTH TENSION GR 75 KSI #28 THREADED BAR
	ROCK SOCKETED 9 5/8"Ø x 0.545" GRADE 80KSI COMPRESSION BATTERED MICROPILE (3H:1V) WITH FULL FACE BIT AND FULL LENGTH GR 75 KSI #28 THREADED BAR
Ⓐ	BATTER PILE ℄
Ⓑ	VERTICAL PILE ℄
Ⓒ	SECANT PILE ℄ AT RELEIVING PLATFORM



DETAIL-PARTIAL PLAN
RELIEVING PLATFORM PILE LOC. PLAN

2 / S1

0 10 20
SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - REVISE PLATFORM ELEV.	WHW
0	06/13/2014	FOR BID	WHW

Attention:
0 1"
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STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed: *FS/CBG*
Checked: *WHW*
Drawn: *DTE*
Submitted By: *WHW*
NY P.E. No.: *86268*
Submittal Date: 06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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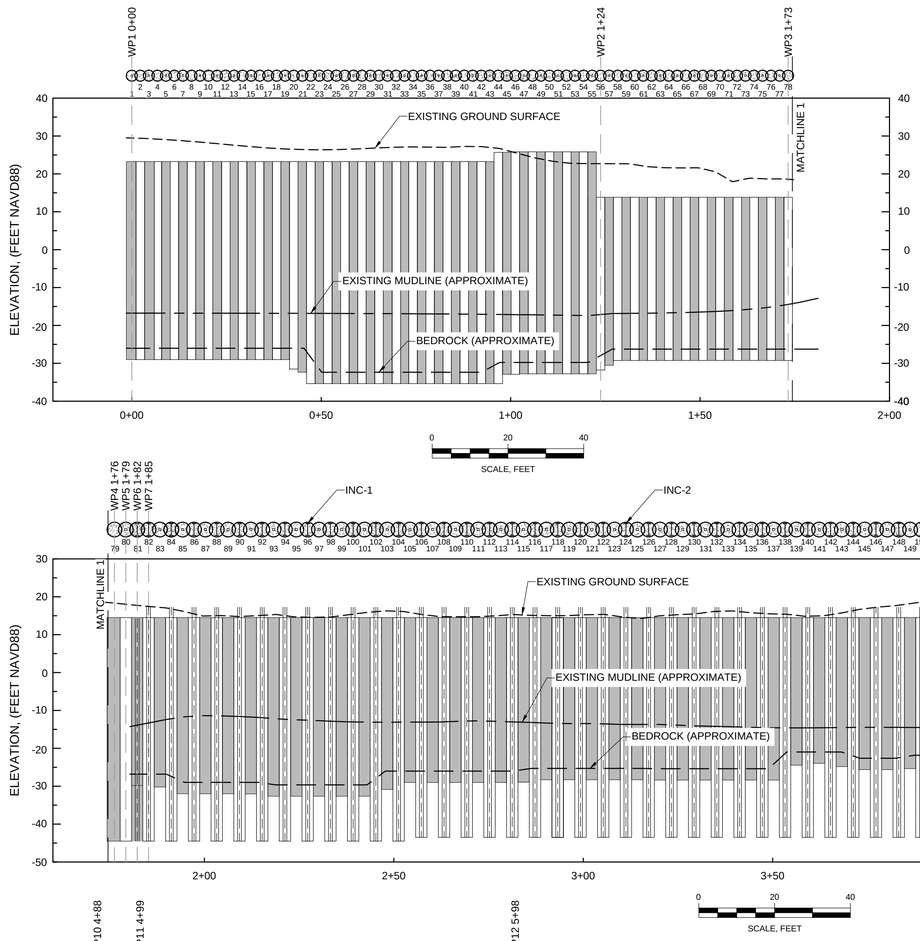
GEI Project 116830

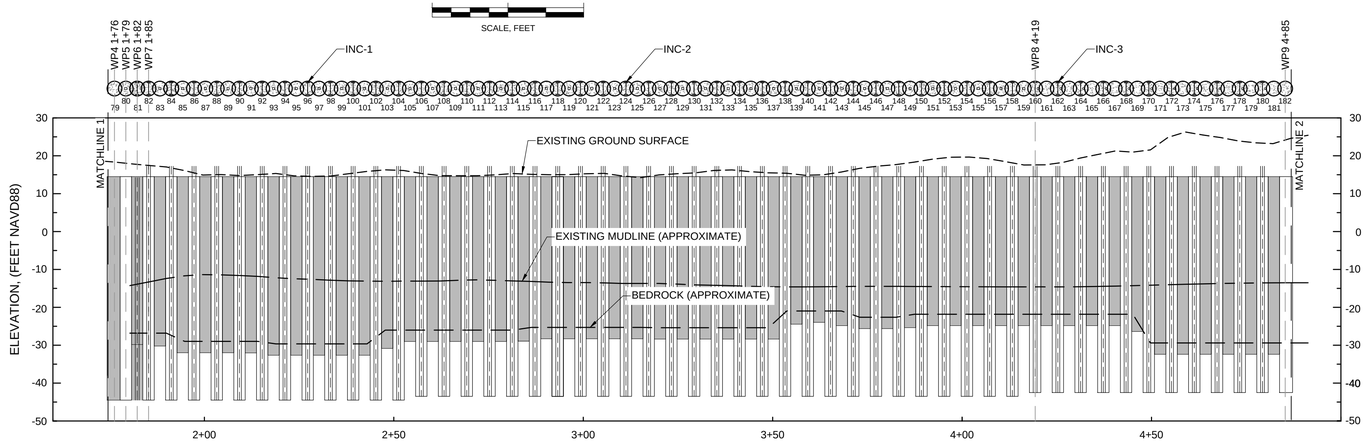
Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

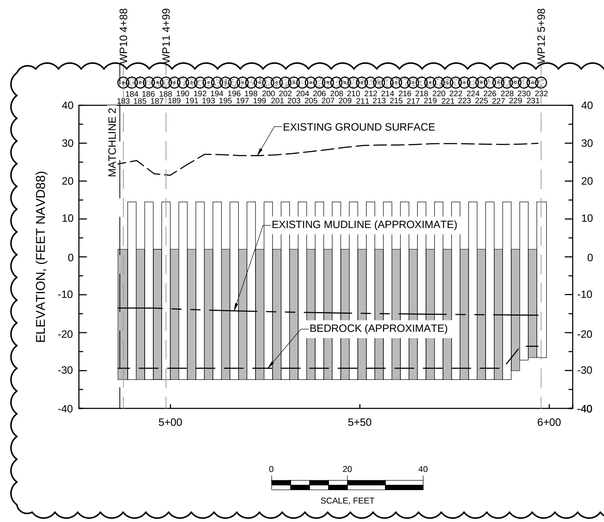
EXISTING BULKHEAD WALL ELEVATION & PROPOSED RELIEVING PLATFORM PART PLANS

DWG. NO. S2

SHEET NO. 22 of 35







NOTES:

1. INSTALL INCLINOMETER CASING EXTENDED 10 FEET BELOW BOTTOM OF PILE IN PILE NUMBERS 96, 124, AND 162. INCLINOMETER LOCATIONS ARE DENOTED AS INC-1, INC-2, AND INC-3.
2. INCLINOMETER CASING TO BE 2.75 INCH (70 MM) DIAMETER ABS PLASTIC WITH FLUSH JOINTS.
3. COMPRESSIVE STRENGTH OF TREMIE PLACED CONCRETE SHALL BE NO LESS THAN 4,000 PSI AT 28 DAYS.
4. SIX-INCH GROUT PIPES AND 7-INCH X 7-INCH STEEL TUBES NOT SHOWN IN ELEVATION FOR CLARITY.
5. DETAILS ARE INCLUDED IN THE FENDERING SYSTEM PLAN ON DRAWING S8.
6. SEE SCHEDULE FOR TOP AND TIP ELEVATIONS.
7. FILL ABOVE TOP OF CONCRETE FOR SECANT PILES NOT WITHIN 3.5 FEET OF PROPOSED GRADE TO MEET THE REQUIREMENTS OF NYSDOT SECTION 703-02 SIZE 1A CRUSHED STONE, CRUSHED GRAVEL, OR SCREENED GRAVEL. MEANS AND METHODS OF STONE PAYMENT ARE TO BE DETERMINED BY THE CONTRACTOR AND MAY REQUIRE THE USE OF POLYMER DRILLING FLUID FOR TEMPORARY SUPPORT.

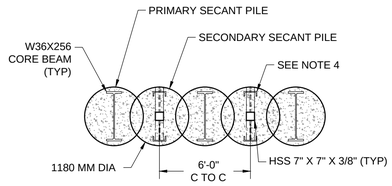
LEGEND:

- EXISTING GROUND SURFACE
- EXISTING MUDLINE
- BEDROCK
- PRIMARY SECANT PILE
- SECONDARY SECANT PILE

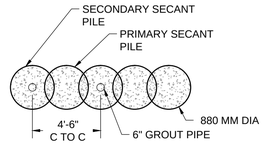
SECANT PILE SCHEDULE					
PILE NUMBER	DIA. (MM)	TOP EL.	BOTTOM EL.	REINFORCEMENT*	GROUT TUBE
1 TO 78	880	3.6 FEET BELOW PROP. GROUND SURFACE	3 FEET BELOW BEDROCK	NONE	6 INCH GROUT PIPE (EVEN NUMBER PILES)
79 TO 80	1180	EL. +14.5	EL. -44.5	NONE	6 INCH GROUT PIPE (EVEN NUMBER PILES)
81	1180	EL. +14.5	EL. -44.5	W36X256	NONE
82 TO 104	1180	EL. +14.5	EL. -44.5 (1)	W36X256 (EVEN NUMBER PILES)	7 INCH X 7 INCH TUBE (ODD NUMBER PILES)
105 TO 159	1180	EL. +14.5	EL. -43.5 (1)	W36X256 (EVEN NUMBER PILES)	7 INCH X 7 INCH TUBE (ODD NUMBER PILES)
160 TO 180	1180	EL. +14.5	EL. -42.5 (1)	W36X256 (EVEN NUMBER PILES)	6 INCH GROUT PIPE (ODD NUMBER PILES)
181 TO 182	1180	EL. +14.5	EL. -42.5	NONE	6 INCH GROUT PIPE (ODD NUMBER PILES)
183 TO 232	880	EL. +14.5 (EVEN NUMBER PILES) EL. +2 (ODD NUMBER PILES)	3 FEET BELOW BEDROCK	NONE	6 INCH GROUT PIPE (ODD NUMBER PILES)
NOTE(1): EXTEND EVEN NUMBER PILES TO SPECIFIED ELEVATION, EXTEND ODD NUMBER PILES TO 3 FEET BELOW BEDROCK					

* USE ASTM A572 STEEL, GRADE 50 KSI

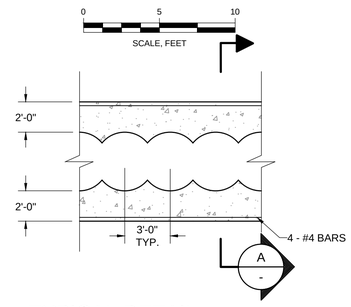
2 ***NOTES:***
A. TOP OF REINFORCEMENT CORE BEAM IN SECANT PILE NUMBER 81 AT EL. +14.25.
B. EXTEND PILES 183 TO 232 FROM THE TOP OF CONCRETE TO WITHIN 3 FEET OF THE PROPOSED GRADE WITH NYSDOT SIZE 1A CRUSHED STONE, CRUSHED GRAVEL OR SCREENED GRAVEL.
C. EXTEND GROUT TUBES IN ALL SECONDARY PILES TO PROPOSED GRADE.



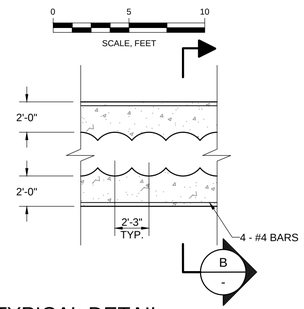
TYPICAL DETAIL (STA 1+73.24 TO 4+85.06)
1180MM SECANT PILE WALL



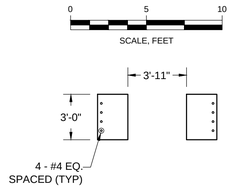
TYPICAL DETAIL (STA 0+00 TO 1+73.24 AND 4+85.06 TO 5+97.83)
880MM SECANT PILE WALL



TYPICAL DETAIL
1180MM SECANT PILE GUIDEWALL

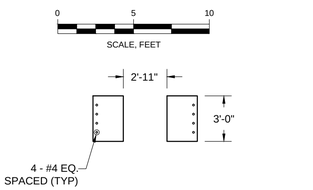


TYPICAL DETAIL
880MM SECANT PILE GUIDEWALL



TYPICAL DETAIL
BEDROCK GROUT HOLE

SECTION
1180MM SECANT PILE GUIDEWALL A -



SECTION
880MM SECANT PILE GUIDEWALL B -

FOR BID

NO.	DATE	ISSUE/REVISION	APP
2	08/25/2014	ADD 5 - UPDATE SECANT PILES	WHW
1	06/27/2014	UPDATE SECANT PILE EL, ADD DETAIL	WHW
0	06/13/2014	FOR BID	WHW

Attention: 0 1" If this scale bar does not measure 1" then drawing is not original scale.

STATE OF NEW YORK WILLIAM H. WALTON LICENSED PROFESSIONAL ENGINEER 086268

Designed: FS/CBG
Checked: WHW
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86268
Submittal Date: 06/13/2014

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1301 Trumansburg Road
Ithaca, New York
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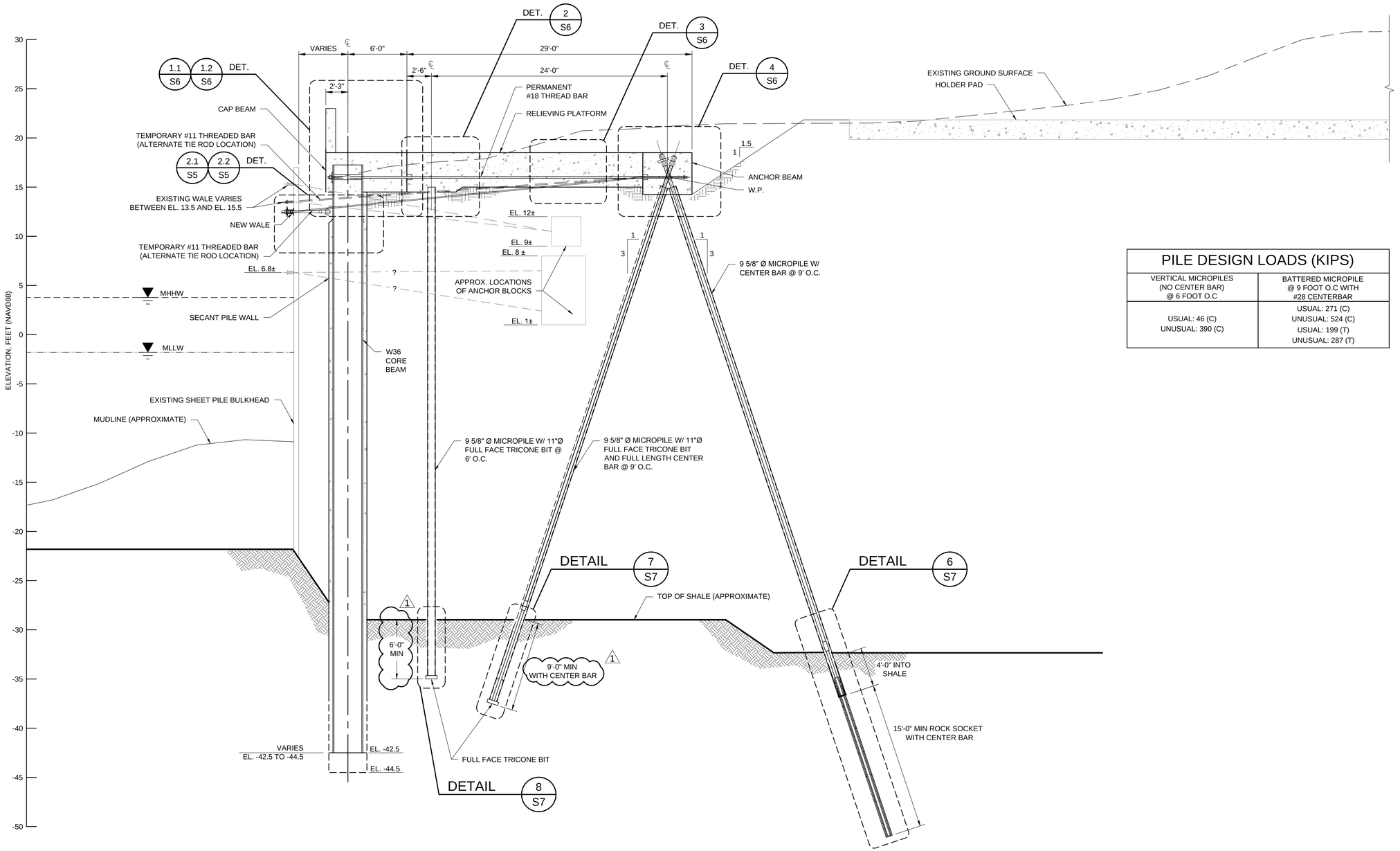
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

SECANT PILE WALL ELEVATIONS & DETAILS

DWG. NO. S3

SHEET NO. 23 of 35



PILE DESIGN LOADS (KIPS)

VERTICAL MICROPILES (NO CENTER BAR) @ 6 FOOT O.C	BATTERED MICROPILE @ 9 FOOT O.C WITH #28 CENTERBAR
USUAL: 46 (C) UNUSUAL: 390 (C)	USUAL: 271 (C) UNUSUAL: 524 (C) USUAL: 199 (T) UNUSUAL: 287 (T)

NOTES:

1. CONTRACTOR REQUIRED TO LOCATE ALL EXISTING TIERODS BY VACUUM EXCAVATION OR PROBING TO AVOID DAMAGING TIERODS DURING PILE INSTALLATION.

TYPICAL SECTION

ANCHOR BEAM, RELIEVING PLATFORM AND CAP BEAM

0 5 10

3/16" = 1'-0"

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - REVISE SOCKET LENGTH	WHW
0	06/13/2014	FOR BID	WHW

Attention:

0 1"

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STATE OF NEW YORK WILLIAM H. WALTON 086268 LICENSED PROFESSIONAL ENGINEER

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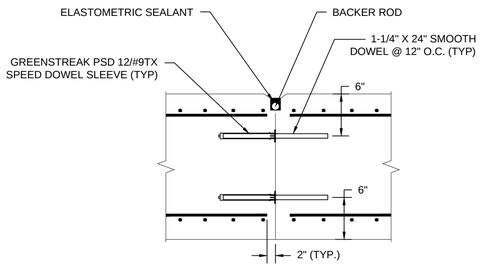
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

RELIEVING PLATFORM & SECANT PILE WALL SECTION

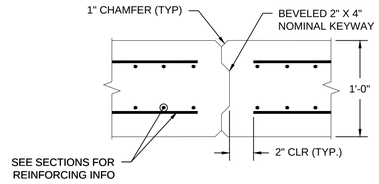
DWG. NO. S4

SHEET NO. 24 of 35



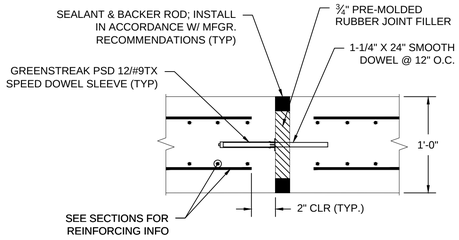
TYPICAL CONTRACTION JOINT DETAIL - RELIEVEING PLATFORM

NOT TO SCALE



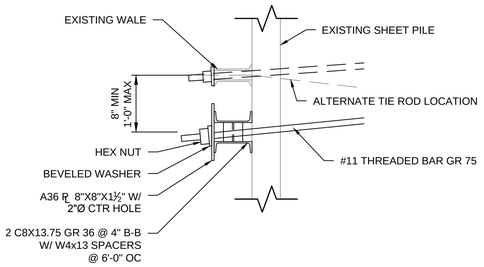
TYPICAL CONTRACTION JOINT DETAIL PLAN VIEW - WALLS

NOT TO SCALE



TYPICAL EXPANSION JOINT DETAIL PLAN VIEW - WALLS

NOT TO SCALE

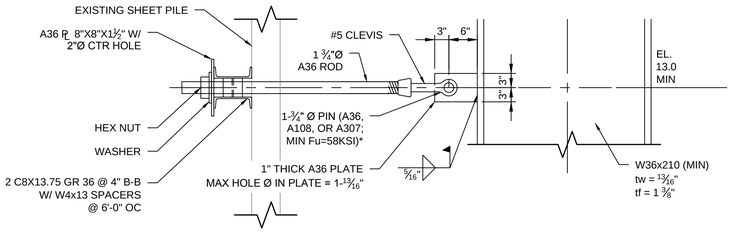


NOTE:
CONNECT TIE ROD TO EXISTING OR NEW WALE

DETAIL 2.1 S4

TEMPORARY WALL SUPPORT DETAILS - PHASE 1

0 1 2
3/4" = 1'-0"

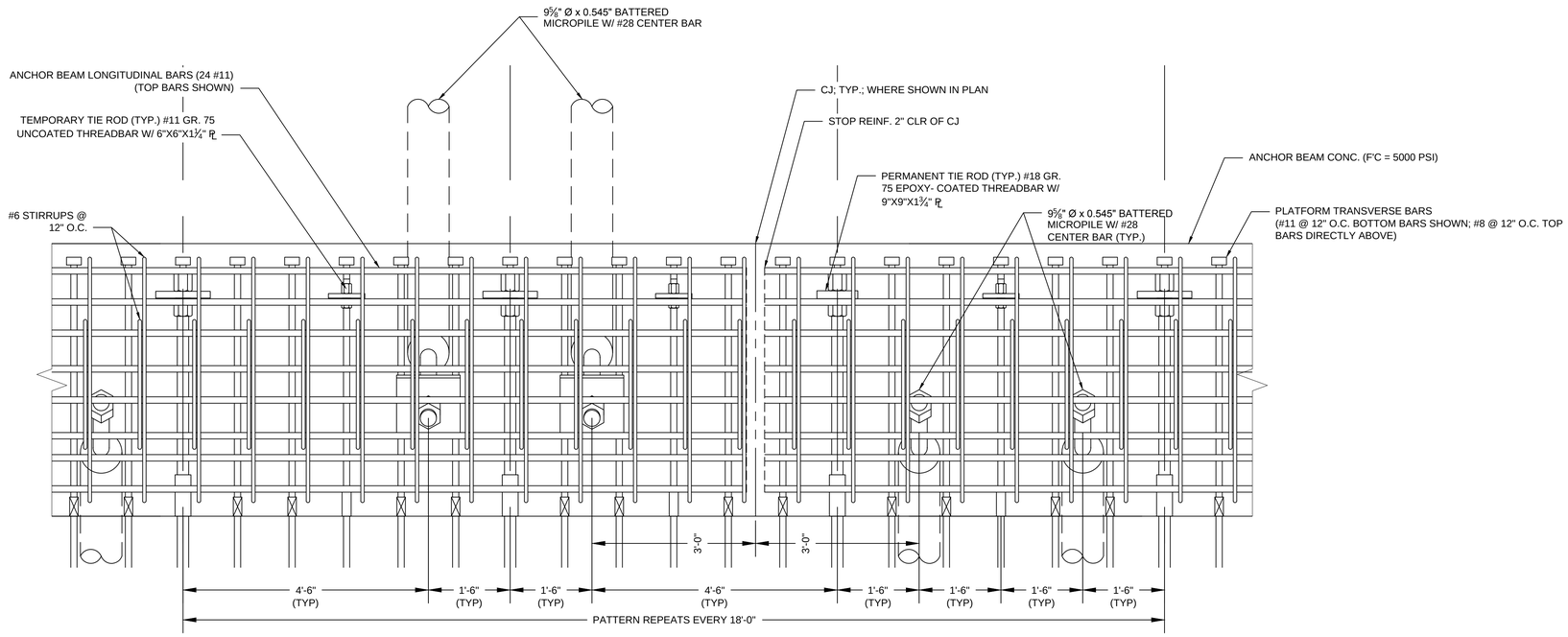


NOTE:
CONNECT TIE ROD TO EXISTING OR NEW WALE.

DETAIL 2.2 S4

TEMPORARY WALL SUPPORT DETAILS - PHASE 2

0 1 2
3/4" = 1'-0"



ANCHOR BEAM-PARTIAL PLAN 1 S2

0 1 2
3/4" = 1'-0"

FOR BID

NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	WHW

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

STATE OF NEW YORK WILLIAM H. WALTON 086288 LICENSED PROFESSIONAL ENGINEER

Designed: FS/CG
Checked: WHW
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86288
Submittal Date: 06/13/2014

GEI Consultants Inc, PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

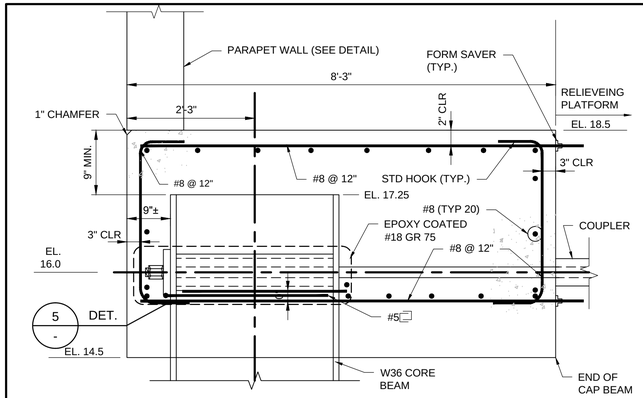
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

RELIEVING PLATFORM AND SECANT PILE WALL SECTION AND DETAILS (SHEET 1 OF 3)

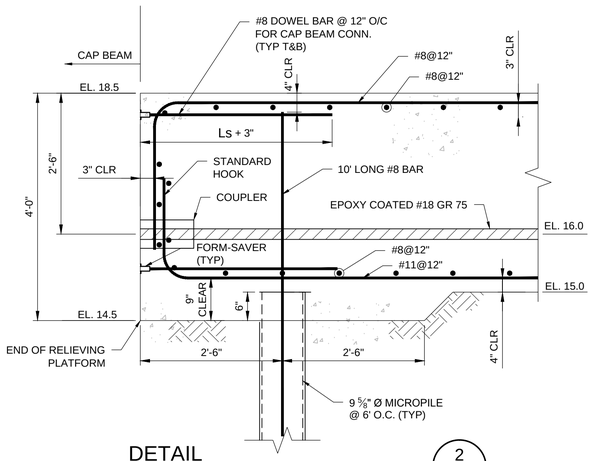
DWG. NO. S5

SHEET NO. 25 of 35



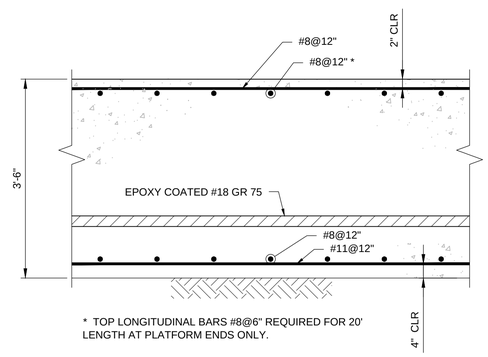
DETAIL 1.1 / S4
SECANT PILE CAP BEAM

0 1 2
3/4" = 1'-0"



DETAIL 2 / S4
RELIEVING PLATFORM (RIVERSIDE)

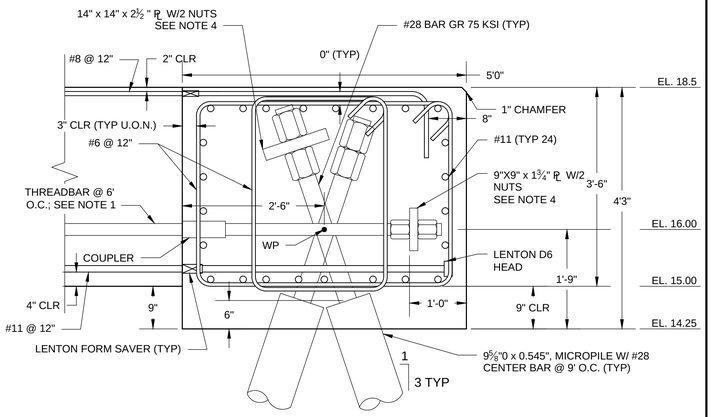
0 1 2
3/4" = 1'-0"



* TOP LONGITUDINAL BARS #8@6" REQUIRED FOR 20' LENGTH AT PLATFORM ENDS ONLY.

DETAIL 3 / S4
RELIEVING PLATFORM TYPICAL REINFORCEMENT

0 1 2
3/4" = 1'-0"

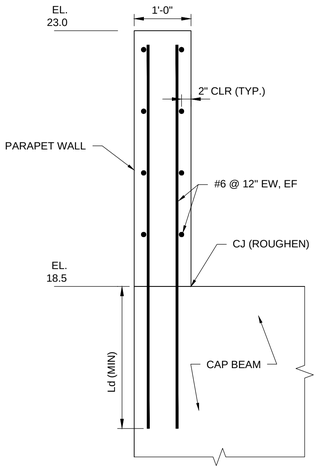


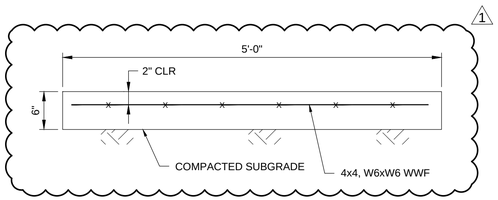
DETAIL 4 / S4
ANCHOR BEAM

0 1 2
3/4" = 1'-0"

NOTES

1. PERMANENT THREADBAR (#18 GR. 75 EPOXY-COATED) & ANCHOR PLATE SHOWN. TEMPORARY THREADBAR (#10 GR. 75 NON-EPOXY-COATED) & ANCHOR PLATE NOT SHOWN; SEE ANCHOR BEAM PLAN.
2. ALL BARS EXCEPT #28 & #14 THREADBARS UNCOATED.
3. PLATFORM LONGITUDINAL BARS NOT SHOWN.
4. ANCHOR PLATES, NUTS, AND COUPLERS FOR #28 AND #18 THREADBARS EPOXY-COATED. PLATE NOT REQUIRED FOR COMPRESSION PILES.
5. TORCH CUTTING REBAR WILL NOT BE PERMITTED.





TYPICAL SECTION
SIDEWALK
NO SCALE

SIDEWALK NOTES

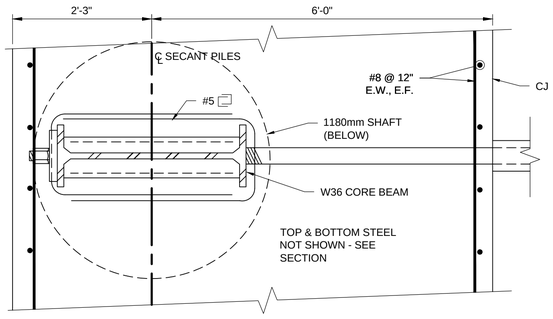
1. PROVIDE EQUALLY SPACED, 1" DEEP TOOLED JOINTS EVERY 4-6 FEET. COORDINATE JOINT SPACING WITH WWF SHEET SIZE.
2. PROVIDE 1-1/2" HIGH CRACK INDUCER AT BOTTOM OF SLAB AT EACH JOINT. CENTER CRACK INDUCER ON JOINT. CRACK INDUCER MAY BE PRE-FABRICATED OR FIELD FABRICATED FROM DIMENSIONAL LUMBER.
3. PROVIDE EQUALLY SPACED, FULL DEPTH ½" EXPANSION JOINTS A MAXIMUM SPACING OF 24 FEET.
4. STOP WWF 2-3 INCHES CLEAR OF JOINTS.
5. PROVIDE ISOLATION JOINT BETWEEN SIDEWALK AND PARAPET WALL.

DETAIL 1.2 / S4
PARAPET WALL AT CAP BEAM

0 1 2
3/4" = 1'-0"

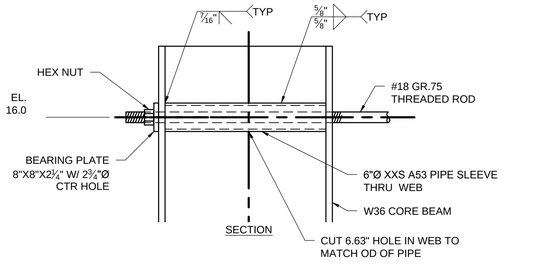
PARAPET WALL NOTES

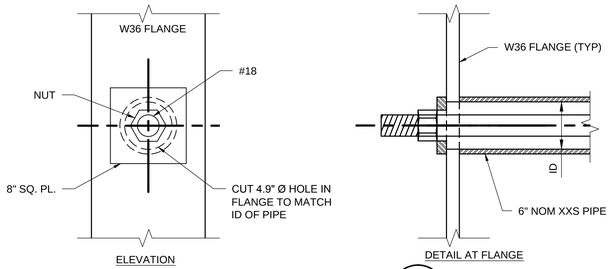
1. ADJUST #6 VERTICAL BARS TO CLEAR CORE BEAMS.
2. CORE BEAMS & TIE RODS NOT SHOWN FOR CLARITY.
3. CENTER SLEEVE FOR HANDRAIL POSTS IN WALL.
4. INSTALL EXPANSION JOINTS IN PARAPET WALL TO MATCH CONSTRUCTION JOINTS IN CAP BEAM. INSTALL CONTRACTION JOINTS BETWEEN EXPANSION JOINTS AT 25FT MAX. SEE TYPICAL DETAILS FOR JOINT REQUIREMENTS.



CAP BEAM - PARTIAL PLAN
SECANT PILE CAP BEAM

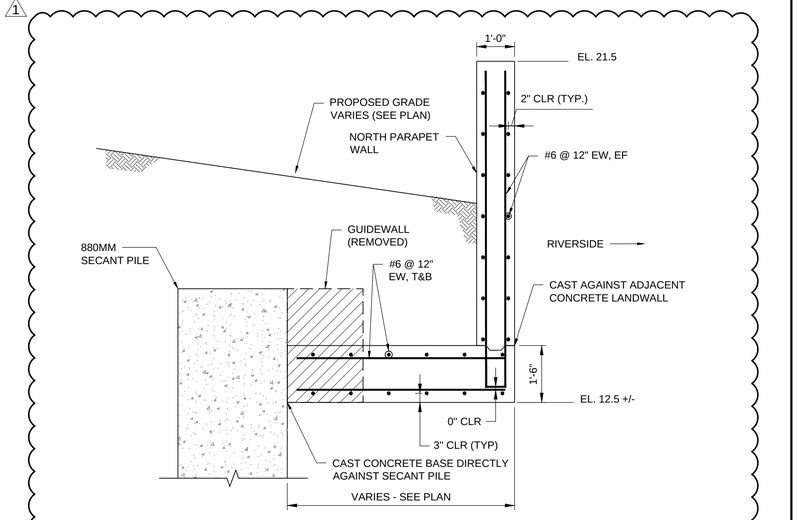
0 1 2
3/4" = 1'-0"





DETAIL 5 / -
PERMANENT TIE ROD CONNECTION

0 1 2
3/4" = 1'-0"



TYPICAL SECTION
NORTH PARAPET WALL (LOOKING SOUTH)

0 2 4
1/2" = 1'-0"

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - UPDATE STRUCTURAL DET'S	WHW
0	06/13/2014	FOR BID	WHW

Attention:

0 1"

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STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed: FS/CBG
Checked: WHW
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86268
Submittal Date: 06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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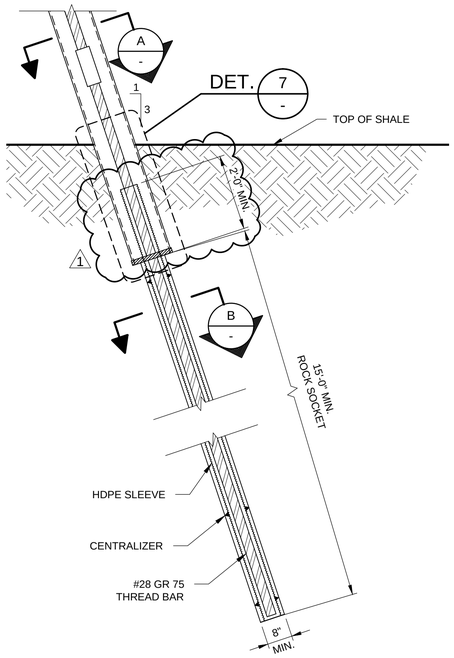
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

RELIEVING PLATFORM AND SECANT PILE WALL SECTION AND DETAILS (SHEET 2 OF 3)

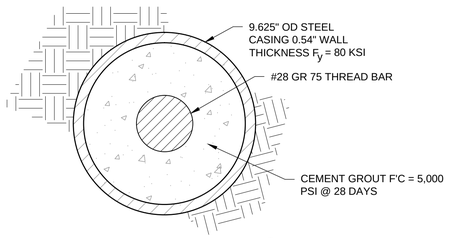
DWG. NO. S6

SHEET NO. 26 of 35



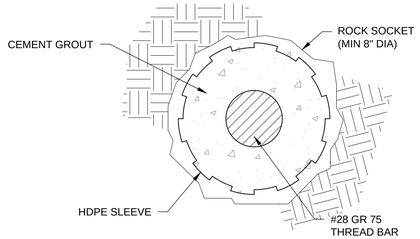
DETAIL 6
ROCK SOCKET
S4

0 1 2
1/2" = 1'-0"



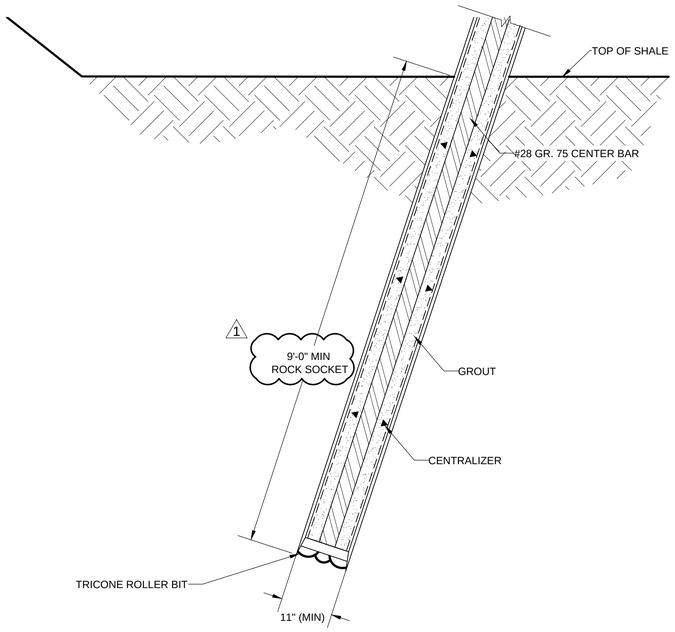
TYPICAL SECTION A
MICROPILE
-

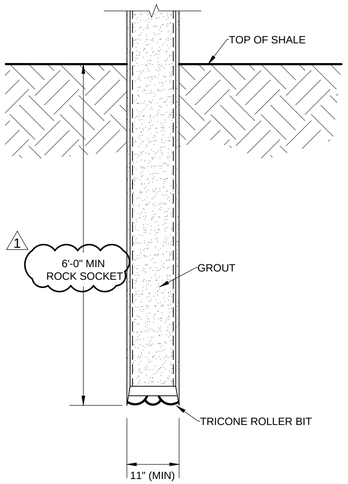
0 4" 8"
3" = 1'-0"



TYPICAL SECTION B
MICROPILE
-

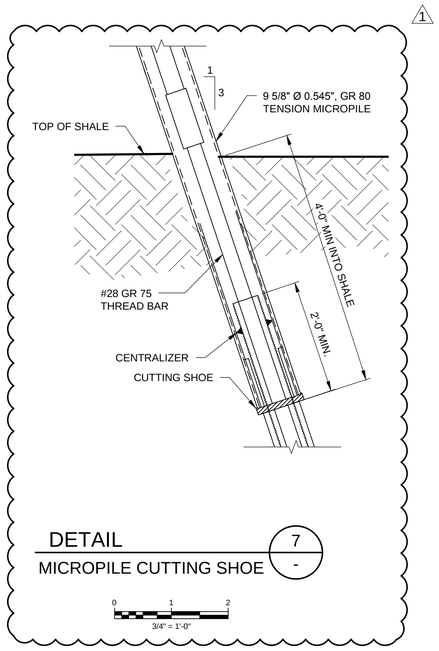
0 4" 8"
3" = 1'-0"





TYPICAL DETAIL 8
VERTICAL COMPRESSION MICROPILE
S4

0 4" 8"
3" = 1'-0"



DETAIL 7
MICROPILE CUTTING SHOE
-

0 1 2
3/4" = 1'-0"

TYPICAL DETAIL 7
BATTERED COMPRESSION MICROPILE
S4

0 4" 8"
3" = 1'-0"

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - REVISE SOCKET LENGTH	WHW
0	06/13/2014	FOR BID	WHW

Attention:

0 1"

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STATE OF NEW YORK WILLIAM H. WALTON 086268 LICENSED PROFESSIONAL ENGINEER

Designed: FS/CBG
Checked: WHW
Drawn: DTE
Submitted By: WHW
NY P.E. No.: 86268
Submittal Date: 06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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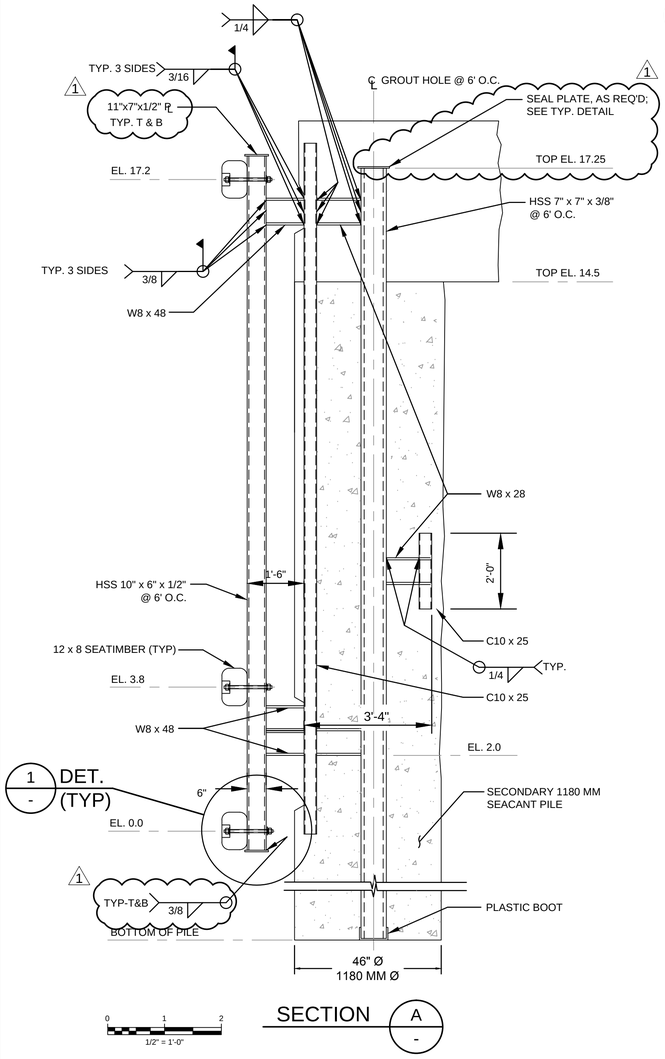
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

MICROPILE SECTIONS AND DETAILS

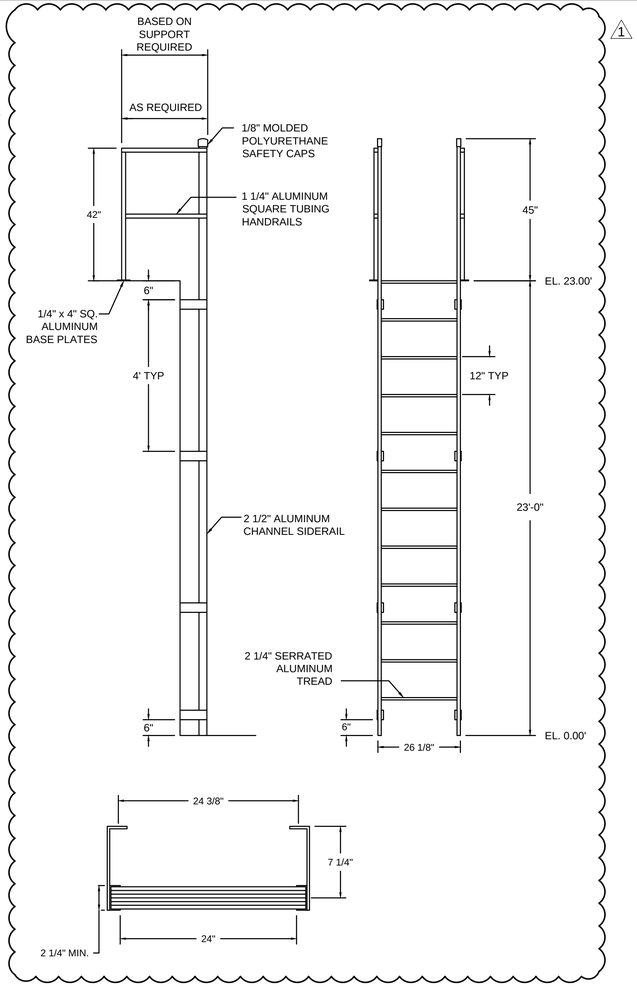
DWG. NO. S7

SHEET NO. 27 of 35



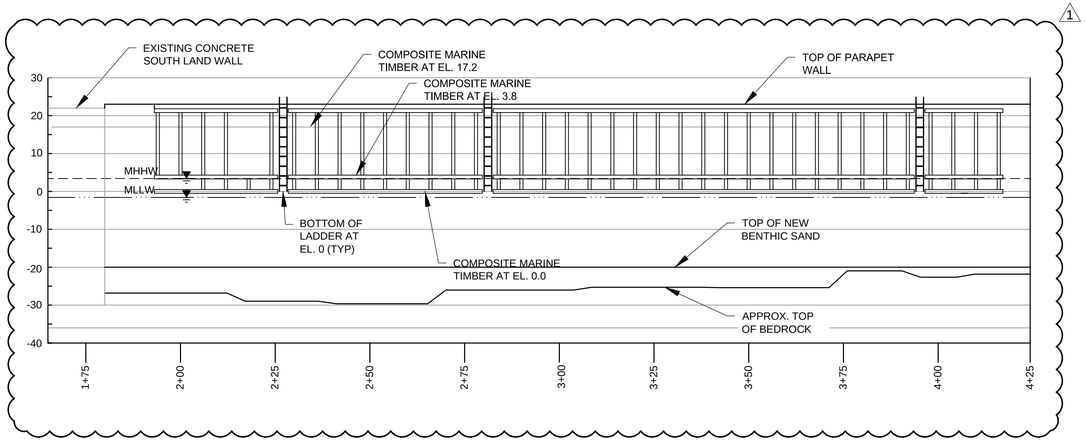
0 1 2
1/2" = 1'-0"

SECTION A -



LADDER (TYP.) DETAIL
FOR INFORMATIONAL PURPOSES ONLY

NOT TO SCALE



ELEVATION LOOKING EAST
NEW SECANT PILE BULKHEAD

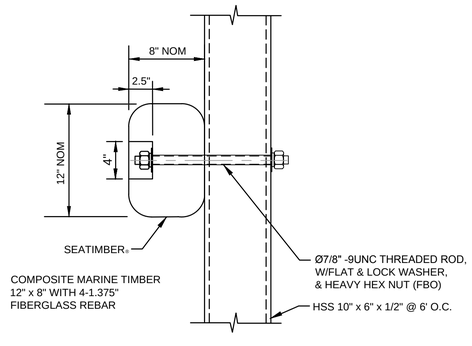
0 20 40
SCALE, FEET

FENDERING SYSTEM PARTIAL PLAN

0 1 2
1/2" = 1'-0"

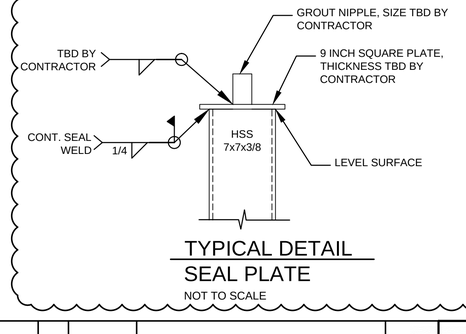
NOTES:

1. THE FENDERING SYSTEM IS COMPOSED OF PILES SPACED AT 6' O.C. AND THREE STINGERS AT ELEVATIONS 17.2, 3.8, AND 0.0 TO PROVIDE FENDERING AND MOORING IN THE TIDAL RANGE MHHW-MLLW.
2. CLEATS SHALL BE ALUMINUM CLEAT 12-INCH MODEL C-12A AND CONNECTED TO THE SEATIMERS AS PER MANUFACTURER SPECIFICATION.
3. PROVIDE 18 CLEATS ALONG THE FENDERING SYSTEM AT LOCATIONS TBD BY THE CM/ENGINEER.
4. CONTRACTOR SHALL DESIGN, DETAIL, AND PROVIDE THREE LADDERS WITH PLATFORMS AT LOCATIONS SHOWN ON THE DRAWING. CONTRACTOR SHALL PROVIDE DESIGN DETAILS TO NATIONAL GRID FOR REVIEW AND ACCEPTANCE PRIOR TO FABRICATION. THE LADDER SHALL MEET OSHA STANDARD. A TYPICAL LADDER DETAIL IS SHOWN IN THIS DRAWING. ALL BOLTS/FASTENERS NECESSARY TO ANCHOR LADDER ARE CONTRACTOR RESPONSIBILITY.
5. HANDRAILS OMITTED FOR CLARITY IN LADDER DETAIL.



DETAIL 1 -

0 1 2
1 1/2" = 1'-0"



TYPICAL DETAIL
SEAL PLATE

NOT TO SCALE

NOTES:

A. SEAL PLATE REQUIRED FOR SECANT PILES REQUIRING PRESSURE GROUTING ONLY.
B. CUT OFF NIPPLE FLUSH WITH PLATE AFTER GROUT HAS SET.

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - REVISE NOTES AND DETAILS	WHW
0	06/13/2014	FOR BID	WHW

Attention:

0 1"

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STATE OF NEW YORK WILLIAM H. WALTON 086263 LICENSED PROFESSIONAL ENGINEER

Designed:	*FS/CBG*
Checked:	*WHW*
Drawn:	*DTE*
Submitted By:	*WHW*
NY P.E. No.:	*86268*
Submittal Date:	06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
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607-216-8955

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Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

FENDER SECTIONS AND DETAILS

DWG. NO. S8

SHEET NO. 28 of 35

STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

A. GENERAL

1. THE DESIGN, ENGINEERING, AND CONSTRUCTION OF THE FORMWORK IS THE RESPONSIBILITY OF THE CONTRACTOR. DESIGN FORMWORK IN ACCORDANCE WITH METHODOLOGY OF ACI 347 FOR ANTICIPATED LOADS, LATERAL PRESSURES, AND STRESSES, AND CAPABLE OF WITHSTANDING THE PRESSURES RESULTING FROM PLACEMENT AND VIBRATION OF CONCRETE.

B. PRODUCTS

1. FORMS FOR FINISHED SURFACES SHALL BE PLYWOOD PANELS CONFORMING TO APA L870, GRADE B-B CONCRETE FORM PANELS, CLASS I OR II.
2. FORM TIES SHALL BE FACTORY-FABRICATED METAL TIES, SHALL BE OF THE REMOVABLE OR INTERNAL DISCONNECTING OR SNAP-OFF TYPE, AND SHALL BE OF A DESIGN THAT WILL NOT PERMIT FORM DEFLECTION AND WILL NOT SPALL CONCRETE UPON REMOVAL.
3. FORM RELEASING AGENTS SHALL BE COMMERCIAL FORMULATIONS THAT WILL NOT BOND WITH, STAIN OR ADVERSELY AFFECT CONCRETE SURFACES.

C. EXECUTION

1. FORMS SHALL BE CONSTRUCTED TRUE TO THE STRUCTURAL DESIGN AND REQUIRED ALIGNMENT. FORMS SHALL BE MORTAR TIGHT, PROPERLY ALIGNED AND ADEQUATELY SUPPORTED. CONTINUOUSLY MONITOR THE ALIGNMENT AND STABILITY OF THE FORMS DURING ALL PHASES TO ASSURE THE FINISHED PRODUCT WILL MEET THE REQUIRED SURFACE CLASS SPECIFIED.
2. ALL EXPOSED JOINTS, EDGES AND EXTERNAL CORNERS SHALL BE CHAMFERED BY MOLDING PLACED IN THE FORMS UNLESS THE DRAWINGS SPECIFICALLY STATE THAT CHAMFERING IS TO BE OMITTED OR AS OTHERWISE SPECIFIED. CHAMFERED JOINTS SHALL NOT BE PERMITTED WHERE EARTH OR ROCKFILL IS PLACED IN CONTACT WITH CONCRETE SURFACES. CHAMFERED JOINTS SHALL BE TERMINATED TWELVE INCHES OUTSIDE THE LIMIT OF THE EARTH OR ROCKFILL SO THAT THE END OF THE CHAMFERS WILL BE CLEARLY VISIBLE.
3. FORMS SHALL NOT BE REMOVED WITHOUT APPROVAL.
4. FORMS AND EMBEDDED ITEMS SHALL BE INSPECTED IN SUFFICIENT TIME PRIOR TO EACH CONCRETE PLACEMENT IN ORDER TO CERTIFY TO THE ENGINEER THAT THEY ARE READY TO RECEIVE CONCRETE.
5. EXPOSED CONCRETE EDGES SHALL HAVE FORMED 1-INCH CHAMFERS.

CONCRETE ACCESSORIES

D. GENERAL

1. PROTECT MATERIAL DELIVERED AND PLACED IN STORAGE OFF THE GROUND FROM MOISTURE, DIRT, AND OTHER CONTAMINANTS. DELIVER SEALANTS IN THE MANUFACTURER'S ORIGINAL UNOPENED CONTAINERS.

E. PRODUCTS

1. CONTRACTION JOINT STRIPS SHALL BE 1/8 INCH THICK TEMPERED HARDBOARD CONFORMING TO AHA A135.4, CLASS 1.
2. EXPANSION JOINT FILLER SHALL BE PREFORMED MATERIAL CONFORMING TO ASTM D1751OR ASTM D1752, TYPE I, OR RESIN IMPREGNATED FIBERBOARD CONFORMING TO THE PHYSICAL REQUIREMENTS OF ASTM D1752. UNLESS OTHERWISE INDICATED, FILLER MATERIAL SHALL BE 3/4 INCH THICK AND OF A WIDTH APPLICABLE FOR THE JOINT FORMED. BACKER MATERIAL, WHEN REQUIRED, SHALL CONFORM TO ASTM D5249.
3. JOINT SEALANT SHALL CONFORM TO THE FOLLOWING:
4. PREFORMED POLYCHLOROPRENE ELASTOMERIC TYPE: ASTM D2628.
5. FIELD-MOLDED TYPE: ASTM C920. SEALANT SHALL BE TYPE M, GRADE P OR NS, CLASS 25, USE T FOR HORIZONTAL JOINTS. TYPE M, GRADE NS, CLASS 25, USE NT FOR VERTICAL JOINTS.

F. EXECUTION

1. JOINT LOCATIONS AND DETAILS, INCLUDING MATERIALS AND METHODS OF INSTALLATION OF JOINT FILLERS AND WATERSTOPS, SHALL BE AS SPECIFIED AND INDICATED. IN NO CASE SHALL ANY FIXED METAL BE CONTINUOUS THROUGH AN EXPANSION OR CONTRACTION JOINT.
2. UNLESS OTHERWISE DETAILED ON THESE DRAWINGS, CONTRACTION JOINTS MAY BE CONSTRUCTED BY INSERTING TEMPERED HARDBOARD STRIPS OR RIGID PVC OR HIPS INSERT STRIPS INTO THE PLASTIC CONCRETE USING A STEEL PARTING BAR, WHEN NECESSARY, OR BY CUTTING THE CONCRETE WITH A SAW AFTER CONCRETE HAS SET. MAKE JOINTS 1/8 INCH TO 3/16 INCH WIDE AND EXTEND INTO THE SLAB ONE-FOURTH THE SLAB THICKNESS, MINIMUM, BUT NOT LESS THAN 1 INCH.
3. COAT JOINTS REQUIRING A BOND BREAKER WITH CURING COMPOUND OR WITH BITUMINOUS PAINT. PROTECT WATERSTOPS DURING APPLICATION OF BOND BREAKING MATERIAL TO PREVENT THEM FROM BEING COATED.
4. USE PREFORMED EXPANSION JOINT FILLER IN EXPANSION AND ISOLATION JOINTS IN SLABS AROUND COLUMNS AND BETWEEN SLABS ON GRADE AND VERTICAL SURFACES WHERE INDICATED. EXTEND THE FILLER TO THE FULL SLAB DEPTH, UNLESS OTHERWISE INDICATED.
5. FILL SAWED CONTRACTION JOINTS AND EXPANSION JOINTS IN SLABS WITH JOINT SEALANT, UNLESS OTHERWISE SHOWN.
6. TREAT CONSTRUCTION JOINTS COINCIDING WITH EXPANSION AND CONTRACTION JOINTS AS EXPANSION OR CONTRACTION JOINTS AS APPLICABLE.

CONCRETE REINFORCING

G. GENERAL

1. REINFORCEMENT AND ACCESSORIES SHALL BE STORED OFF THE GROUND ON PLATFORMS, SKIDS, OR OTHER SUPPORTS.

H. PRODUCTS

1. DOWELS SHALL CONFORM TO ASTM A36/A36M.
2. FABRICATED BAR MATS SHALL CONFORM TO ASTM A184/A184M.
3. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615/A615M OR ASTM A706/A706M GRADES AND SIZES AS INDICATED. COLD DRAWN WIRE USED FOR SPIRAL REINFORCEMENT SHALL CONFORM TO ASTM A82/A82M.
4. EPOXY-COATED STEEL BARS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A775/A775M, INCLUDING WRITTEN CERTIFICATIONS FOR COATING MATERIAL AND COATED BARS, SAMPLE OF COATING MATERIAL, AND 1.5 POUNDS OF PATCHING MATERIAL.
5. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185/A185M.
6. WIRE TIES SHALL BE 16 GAUGE OR HEAVIER BLACK ANNEALED STEEL WIRE. TIES FOR EPOXY-COATED BARS SHALL BE VINYL-COATED OR EPOXY-COATED.
7. BAR SUPPORTS FOR FORMED SURFACES SHALL BE DESIGNED AND FABRICATED IN ACCORDANCE WITH CRSI 10MSP AND SHALL BE STEEL OR PRECAST CONCRETE BLOCKS.

I. EXECUTION

1. REINFORCEMENT STEEL AND ACCESSORIES SHALL BE FABRICATED AND PLACED AS SPECIFIED AND SHOWN AND APPROVED SHOP DRAWINGS. FABRICATION AND PLACEMENT DETAILS OF STEEL AND ACCESSORIES NOT SPECIFIED OR SHOWN SHALL BE IN ACCORDANCE WITH ACI SP-66 AND ACI 318. REINFORCEMENT SHALL BE COLD BENT UNLESS OTHERWISE AUTHORIZED. BENDING MAY BE ACCOMPLISHED IN THE FIELD OR AT THE MILL. ZINC-COATED AND EPOXY-COATED BARS SHALL BE MILL-BENT PRIOR TO COATING. ALL STEEL SHALL BE BENT COLD UNLESS AUTHORIZED. BARS SHALL NOT BE BENT AFTER EMBEDMENT IN CONCRETE. SAFETY CAPS SHALL BE PLACED ON ALL EXPOSED ENDS OF VERTICAL CONCRETE REINFORCEMENT BARS THAT POSE A DANGER TO LIFE SAFETY. WIRE TIE ENDS SHALL FACE AWAY FROM THE FORMS.
2. REINFORCEMENT SHALL BE FREE FROM LOOSE RUST AND SCALE, DIRT, OIL, OR OTHER DELETERIOUS COATING THAT COULD REDUCE BOND WITH THE CONCRETE. REINFORCEMENT SHALL BE PLACED IN ACCORDANCE WITH ACI 318 AT LOCATIONS SHOWN PLUS OR MINUS ONE BAR DIAMETER. REINFORCEMENT SHALL NOT BE CONTINUOUS THROUGH EXPANSION JOINTS AND SHALL BE AS INDICATED THROUGH CONSTRUCTION OR CONTRACTION JOINTS. CONCRETE COVERAGE SHALL BE AS INDICATED OR AS REQUIRED BY ACI 318.
3. SPLICES OF REINFORCEMENT SHALL CONFORM TO ACI 318 AND SHALL BE MADE ONLY AS REQUIRED OR INDICATED.
4. DOWELS SHALL BE INSTALLED IN SLABS ON GRADE AT LOCATIONS INDICATED AND AT RIGHT ANGLES TO JOINT BEING DOWELED. DOWELS SHALL BE ACCURATELY POSITIONED AND ALIGNED PARALLEL TO THE FINISHED CONCRETE SURFACE BEFORE CONCRETE PLACEMENT. DOWELS SHALL BE RIGIDLY SUPPORTED DURING CONCRETE PLACEMENT.

CAST-IN-PLACE CONCRETE

J. GENERAL

1. EXCEPT AS OTHERWISE SPECIFIED HEREIN, TOLERANCES FOR CONCRETE BATCHING, MIXTURE PROPERTIES, AND CONSTRUCTION AS WELL AS DEFINITION OF TERMS AND APPLICATION PRACTICES SHALL BE IN ACCORDANCE WITH ACI 117.
2. SPECIFIED COMPRESSIVE STRENGTH (F'C) SHALL BE 5000 PSI AT 28 DAYS FOR THE ANCHOR BEAM AND 4000 PSI AT 28 DAYS FOR ALL OTHER PORTIONS OF THE STRUCTURE. CONCRETE MADE WITH HIGH-EARLY STRENGTH CEMENT SHALL HAVE A 7-DAY STRENGTH EQUAL TO THE SPECIFIED 28-DAY STRENGTH FOR CONCRETE MADE WITH TYPE I OR II PORTLAND CEMENT. COMPRESSIVE STRENGTH SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C39/C39M.
3. MAXIMUM WATER-CEMENT RATIO (W/C) FOR CONCRETE SHALL BE AS FOLLOWS 0.45.
4. ALL NORMAL WEIGHT CONCRETE SHALL BE AIR ENTRAINED TO CONTAIN BETWEEN 4 AND 7 PERCENT TOTAL AIR, EXCEPT THAT WHEN THE NOMINAL MAXIMUM SIZE COARSE AGGREGATE IS 3/4 INCH OR SMALLER IT SHALL BE BETWEEN 4.5 AND 7.5 PERCENT. CONCRETE WITH SPECIFIED STRENGTH OVER 5000 PSI MAY HAVE 1.0 PERCENT LESS AIR THAN SPECIFIED ABOVE. SPECIFIED AIR CONTENT SHALL BE ATTAINED AT POINT OF PLACEMENT INTO THE FORMS. AIR CONTENT FOR NORMAL WEIGHT CONCRETE SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C231/C231M.
5. SLUMP OF THE CONCRETE, AS DELIVERED TO THE POINT OF PLACEMENT INTO THE FORMS, SHALL BE WITHIN THE LIMITS SPECIFIED IN SECTION 03 30 00 CAST-IN-PLACE CONCRETE. SLUMP SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C143/C143M.

K. PRODUCTS

1. CEMENTITIOUS MATERIALS SHALL BE PORTLAND CEMENT, OR PORTLAND CEMENT IN COMBINATION WITH POZZOLAN. PORTLAND CEMENT SHALL CONFORM TO ASTM C150/C150M, TYPE I LOW ALKALI WITH A MAXIMUM 15 PERCENT AMOUNT OF TRICALCIUM ALUMINATE, OR TYPE II LOW ALKALI INCLUDING FALSE SET REQUIREMENTS. HIGH-EARLY-STRENGTH PORTLAND CEMENT SHALL CONFORM TO ASTM C150/C150M, TYPE III WITH TRICALCIUM ALUMINATE LIMITED TO 5 PERCENT, LOW ALKALI. USE TYPE III CEMENT ONLY IN ISOLATED INSTANCES AND ONLY WHEN APPROVED IN WRITING. POZZOLAN SHALL CONFORM TO ASTM C618, CLASS C OR F, INCLUDING LOW ALKALI MULTIPLE FACTOR, DRYING SHRINKAGE, UNIFORMITY, AND SEVERE SULFATE RESISTANCE REQUIREMENTS IN TABLE 3 OF ASTM C618.
2. FINE AGGREGATE SHALL CONFORM TO THE QUALITY AND GRADATION REQUIREMENTS OF ASTM C33/C33M. COARSE AGGREGATE SHALL CONFORM TO ASTM C33/C33M.
3. AIR-ENTRAINING ADMIXTURE SHALL CONFORM TO ASTM C260/C260M AND SHALL CONSISTENTLY ENTRAIN THE AIR CONTENT IN THE SPECIFIED RANGES UNDER FIELD CONDITIONS. ACCELERATING ADMIXTURE SHALL CONFORM TO ASTM C494/C494M, TYPE C OR E, EXCEPT THAT CALCIUM CHLORIDE OR ADMIXTURES CONTAINING CALCIUM CHLORIDE SHALL NOT BE USED. WATER-REDUCING OR RETARDING ADMIXTURE SHALL CONFORM TO ASTM C494/C494M, TYPE A, B, OR D. HIGH-RANGE WATER REDUCER SHALL CONFORM TO ASTM C494/C494M, TYPE F OR G.
4. WATER FOR MIXING SHALL BE FRESH, CLEAN, POTABLE, AND FREE OF INJURIOUS AMOUNTS OF OIL, ACID, SALT, OR ALKALI, EXCEPT THAT NON-POTABLE WATER MAY BE USED IF IT MEETS THE REQUIREMENTS OF COE CRD-C 400.

L. EXECUTION

1. BEFORE COMMENCING CONCRETE PLACEMENT, PERFORM THE FOLLOWING: SURFACES TO RECEIVE CONCRETE SHALL BE CLEAN AND FREE FROM FROST, ICE, MUD, AND WATER. FORMS SHALL BE IN PLACE, CLEANED, COATED, AND ADEQUATELY SUPPORTED. REINFORCING STEEL SHALL BE IN PLACE, CLEANED, TIED, AND ADEQUATELY SUPPORTED. TRANSPORTING AND CONVEYING EQUIPMENT SHALL BE IN-PLACE, READY FOR USE, CLEAN, AND FREE OF HARDENED CONCRETE AND FOREIGN MATERIAL. EQUIPMENT FOR CONSOLIDATING CONCRETE SHALL BE AT THE PLACING SITE AND IN PROPER WORKING ORDER. EQUIPMENT AND MATERIAL FOR CURING AND FOR PROTECTING CONCRETE FROM WEATHER OR MECHANICAL DAMAGE SHALL BE AT THE PLACING SITE, IN PROPER WORKING CONDITION AND IN SUFFICIENT AMOUNT FOR THE ENTIRE PLACEMENT.
2. EARTH (SUBGRADE, BASE, OR SUBBASE COURSES) SURFACES UPON WHICH CONCRETE IS TO BE PLACED SHALL BE CLEAN, DAMP, AND FREE FROM DEBRIS, FROST, ICE, AND STANDING OR RUNNING WATER. PRIOR TO PLACEMENT OF CONCRETE, THE FOUNDATION SHALL BE WELL DRAINED AND SHALL BE SATISFACTORILY GRADED AND UNIFORMLY COMPACTED.
3. CONCRETE SURFACES TO WHICH ADDITIONAL CONCRETE IS TO BE BONDED SHALL BE PREPARED FOR RECEIVING THE NEXT HORIZONTAL LIFT BY CLEANING THE CONSTRUCTION JOINT SURFACE WITH EITHER AIR-WATER CUTTING, SANDBLASTING, HIGH-PRESSURE WATER JET, OR OTHER APPROVED METHOD.
4. BEFORE PLACEMENT OF CONCRETE, DETERMINE THAT ALL EMBEDDED ITEMS ARE FIRMLY AND SECURELY FASTENED IN PLACE AS INDICATED ON THE DRAWINGS, OR REQUIRED.
5. CONCRETE SHALL EITHER BE BATCHED AND MIXED ONSITE OR SHALL BE FURNISHED FROM A READY-MIXED CONCRETE PLANT. READY-MIXED CONCRETE SHALL BE BATCHED, MIXED, AND TRANSPORTED IN ACCORDANCE WITH ASTM C94/C94M, EXCEPT AS OTHERWISE SPECIFIED. TRUCK MIXERS, AGITATORS, AND NONAGITATING TRANSPORTING UNITS SHALL COMPLY WITH NRMCA TMMB 100. READY-MIX PLANT EQUIPMENT AND FACILITIES SHALL BE CERTIFIED IN ACCORDANCE WITH NRMCA QC 3. APPROVED BATCH TICKETS SHALL BE FURNISHED FOR EACH LOAD OF READY-MIXED CONCRETE. SITE-MIXED CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 03 30 00 CAST-IN-PLACE CONCRETE.
6. TRANSPORT CONCRETE TO THE PLACING SITE IN TRUCK MIXERS, OR BY APPROVED PUMPING EQUIPMENT OR CONVEYORS. NONAGITATING EQUIPMENT, OTHER THAN PUMPS, SHALL NOT BE USED FOR TRANSPORTING LIGHTWEIGHT AGGREGATE CONCRETE.
7. CONVEY CONCRETE FROM MIXER OR TRANSPORTING UNIT TO FORMS AS RAPIDLY AS POSSIBLE AND WITHIN THE TIME INTERVAL SPECIFIED BY METHODS WHICH WILL PREVENT SEGREGATION OR LOSS OF INGREDIENTS USING FOLLOWING EQUIPMENT. CONVEYING EQUIPMENT SHALL BE CLEANED BEFORE EACH PLACEMENT.
8. DEPOSIT CONCRETE AS CLOSE AS POSSIBLE TO ITS FINAL POSITION IN THE FORMS, AND WITH NO VERTICAL DROP GREATER THAN 5 FEET EXCEPT WHERE SUITABLE EQUIPMENT IS PROVIDED TO PREVENT SEGREGATION AND WHERE SPECIFICALLY AUTHORIZED. IMMEDIATELY AFTER PLACING, CONSOLIDATE EACH LAYER OF CONCRETE BY INTERNAL VIBRATORS, EXCEPT FOR SLABS 4 INCHES THICK OR LESS.

CONCRETE CURING

M. GENERAL

1. MATERIALS SHALL BE STORED IN SUCH A MANNER AS TO AVOID CONTAMINATION AND DETERIORATION. MATERIALS SHALL BE CAPABLE OF BEING ACCURATELY IDENTIFIED AFTER BUNDLES OR CONTAINERS ARE OPENED.

N. PRODUCTS

1. MEMBRANE-FORMING CURING COMPOUND SHALL CONFORM TO ASTM C309, TYPE 1-D OR 2. NONPIGMENTED COMPOUND SHALL CONTAIN A FUGITIVE DYE, AND SHALL HAVE THE REFLECTIVE REQUIREMENTS IN ASTM C309 WAIVED.
2. BURLAP AND COTTON MAT USED FOR CURING SHALL CONFORM TO AASHTO M 182.
3. WATER FOR CURING SHALL BE FRESH, CLEAN, POTABLE, AND FREE OF INJURIOUS AMOUNTS OF OIL, ACID, SALT, OR ALKALI, EXCEPT THAT NON-POTABLE WATER MAY BE USED IF IT MEETS THE REQUIREMENTS OF COE CRD-C 400.

O. EXECUTION

1. IMMEDIATELY AFTER PLACEMENT, PROTECT CONCRETE FROM PREMATURE DRYING, EXTREMES IN TEMPERATURES, RAPID TEMPERATURE CHANGE AND MECHANICAL INJURY FOR THE DURATION OF THE CURING PERIOD. CONCRETE SHALL BE PROTECTED FROM THE DAMAGING EFFECTS OF RAIN FOR 12 HOURS AND FROM FLOWING WATER FOR 14 DAYS. NO FIRE OR EXCESSIVE HEAT INCLUDING WELDING SHALL BE PERMITTED NEAR OR IN DIRECT CONTACT WITH CONCRETE OR CONCRETE EMBEDMENTS AT ANY TIME. MAINTAIN AIR AND FORMS IN CONTACT WITH CONCRETE AT A TEMPERATURE ABOVE 50 DEGREES F FOR THE FIRST 3 DAYS AND AT A TEMPERATURE ABOVE 32 DEGREES F FOR THE REMAINDER OF THE SPECIFIED CURING PERIOD.
2. MAINTAIN CONCRETE, TO BE MOIST-CURED, CONTINUOUSLY WET FOR THE ENTIRE CURING PERIOD, COMMENCING IMMEDIATELY AFTER FINISHING.
3. CONCRETE MAY BE CURED WITH AN APPROVED MEMBRANE-FORMING CURING COMPOUND IN LIEU OF MOIST CURING EXCEPT THAT MEMBRANE CURING WILL NOT BE PERMITTED ON ANY SURFACE TO WHICH A GROUT-CLEANED FINISH IS TO BE APPLIED OR OTHER CONCRETE IS TO BE BONDED, ON ANY SURFACE CONTAINING PROTRUDING STEEL REINFORCEMENT, ON AN ABRASIVE AGGREGATE FINISH. APPLY THE CURING COMPOUND TO FORMED SURFACES IMMEDIATELY AFTER THE FORMS ARE REMOVED AND PRIOR TO ANY PATCHING OR OTHER SURFACE TREATMENT EXCEPT THE CLEANING OF LOOSE SAND, MORTAR, AND DEBRIS FROM THE SURFACE.
4. WHEN THE DAILY AMBIENT LOW TEMPERATURE IS LESS THAN 32 DEGREES F MAINTAIN THE TEMPERATURE OF THE CONCRETE ABOVE 40 DEGREES F FOR THE FIRST SEVEN DAYS AFTER PLACING.

P. CONCRETE TESTING

1. AN INDEPENDENT TESTING AGENCY SHALL BE RETAINED ON SITE TO MEASURE SLUMP, AIR CONTENT, AND COLLECT CYLINDERS (MIN. OF 5) FOR CURING AND TESTING. TEST TWO CYLINDERS AT 7 AND 28 DAYS AND KEEP ONE IN RESERVE.

JOINT SEALANTS

Q. GENERAL

1. DELIVER MATERIALS TO THE JOB SITE IN UNOPENED MANUFACTURERS' EXTERNAL SHIPPING CONTAINERS, WITH BRAND NAMES, DATE OF MANUFACTURE, COLOR, AND MATERIAL DESIGNATION CLEARLY MARKED THEREON. LABEL ELASTOMERIC SEALANT CONTAINERS TO IDENTIFY TYPE, CLASS, GRADE, AND USE. CAREFULLY HANDLE AND STORE MATERIALS TO PREVENT INCLUSION OF FOREIGN MATERIALS OR SUBJECTION TO SUSTAINED TEMPERATURES EXCEEDING 90 DEGREES F OR LESS THAN 0 DEGREES F.
2. VERIFY THAT EACH OF THE SEALANTS ARE COMPATIBLE FOR USE WITH JOINT SUBSTRATES. GUARANTEE SEALANT JOINT AGAINST FAILURE OF SEALANT AND AGAINST WATER PENETRATION THROUGH EACH SEALED JOINT FOR FIVE YEARS.

R. PRODUCTS

1. PROVIDE SEALANT THAT HAS BEEN TESTED AND FOUND SUITABLE FOR THE SUBSTRATES TO WHICH IT WILL BE APPLIED. FOR JOINTS IN VERTICAL SURFACES, PROVIDE ASTM C920, TYPE S OR M, GRADE NS, CLASS 25, USE NT. FOR JOINTS IN HORIZONTAL SURFACES, PROVIDE ASTM C920, TYPE S OR M, GRADE P, CLASS 25, USE T.
2. PRIMERS: PROVIDE A NONSTAINING, QUICK-DRYING TYPE AND CONSISTENCY RECOMMENDED BY THE SEALANT MANUFACTURER FOR THE PARTICULAR APPLICATION.
3. BOND BREAKERS: PROVIDE THE TYPE AND CONSISTENCY RECOMMENDED BY THE SEALANT MANUFACTURER TO PREVENT ADHESION OF THE SEALANT TO BACKING OR TO BOTTOM OF THE JOINT.
4. BACKSTOPS: PROVIDE GLASS FIBER ROVING OR NEOPRENE, BUTYL, POLYURETHANE, OR POLYETHYLENE FOAMS FREE FROM OIL OR OTHER STAINING ELEMENTS AS RECOMMENDED BY SEALANT MANUFACTURER.

S. EXECUTION

1. CLEAN SURFACES FROM DIRT FROST, MOISTURE, GREASE, OIL, WAX, LACQUER, PAINT, OR OTHER FOREIGN MATTER THAT WOULD TEND TO DESTROY OR IMPAIR ADHESION. REMOVE OIL AND GREASE WITH SOLVENT. SURFACES MUST BE WIPED DRY WITH CLEAN CLOTHS. WHERE SURFACES HAVE BEEN TREATED WITH CURING COMPOUNDS, OIL, OR OTHER SUCH MATERIALS, REMOVE MATERIALS BY SANDBLASTING OR WIRE BRUSHING. REMOVE LAITANCE, EFFLORESCENCE AND LOOSE MORTAR FROM THE JOINT CAVITY.
2. INSTALL BACKSTOPS DRY AND FREE OF TEARS OR HOLES. TIGHTLY PACK THE BACK OR BOTTOM OF JOINT CAVITIES WITH BACKSTOP MATERIAL TO PROVIDE A JOINT OF THE DEPTH SPECIFIED.
3. PROVIDE A SEALANT COMPATIBLE WITH THE MATERIAL(S) TO WHICH IT IS APPLIED. DO NOT USE A SEALANT THAT HAS EXCEEDED SHELF LIFE OR HAS JELLED AND CANNOT BE DISCHARGED IN A CONTINUOUS FLOW FROM THE GUN. DO NOT ADD LIQUIDS, SOLVENTS, OR POWDERS TO THE SEALANT. MIX MULTICOMPONENT ELASTOMERIC SEALANTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. PROTECT AREAS ADJACENT TO JOINTS FROM SEALANT SMEARS. MASKING TAPE MAY BE USED FOR THIS PURPOSE IF REMOVED 5 TO 10 MINUTES AFTER THE JOINT IS FILLED. UPON COMPLETION OF SEALANT APPLICATION, REMOVE REMAINING SMEARS AND STAINS AND LEAVE THE WORK IN A CLEAN AND NEAT CONDITION.

DRILLED MICROPILES

T. GENERAL

1. CENTERLINE OF PILING SHALL NOT BE MORE THAN 2 IN. FROM INDICATED PLAN LOCATION. PILE-HOLE ALIGNMENT SHALL BE WITHIN 1 DEGREE OF DESIGN ALIGNMENT. TOP ELEVATION OF PILE SHALL BE WITHIN +/- 1 IN. OF THE DESIGN VERTICAL ELEVATION. CENTERLINE OF CORE REINFORCEMENT SHALL NOT BE MORE THAN ¾ IN. FROM CENTERLINE OF PILING.
2. PROVIDE INFORMATION ON PROPOSED MICROPILE MATERIALS (CASING, CENTER BAR, CUTTING SHOE, TRICONE BIT, ETC.) TO THE ENGINEER FOR REVIEW A MINIMUM OF 30 DAYS PRIOR TO MOBILIZING TO THE SITE.

U. PRODUCTS

1. WATER FOR MIXING GROUT SHALL BE POTABLE, CLEAN AND FREE FROM SUBSTANCES WHICH MAY BE IN ANY WAY DELETERIOUS TO GROUT OR STEEL. IF WATER IS NOT POTABLE, IT SHALL BE TESTED IN ACCORDANCE WITH AASHTO T26 FOR ACCEPTABILITY.
2. ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C494 (AASHTO M194). ADMIXTURES WHICH CONTROL BLEED, IMPROVE FLOWABILITY, REDUCE WATER CONTENT, AND RETARD SET MAY BE USED IN THE GROUT SUBJECT TO THE REVIEW AND ACCEPTANCE OF OWNER.
3. ALL CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150 (AASHTO M85) TYPE I, TYPE II, TYPE I/II, OR TYPE III, AND SHALL BE THE PRODUCT OF ONE MANUFACTURER.
4. CENTRALIZERS AND SPACERS SHALL BE FABRICATED FROM SCHEDULE 40 PVC PIPE OR TUBE, STEEL, OR MATERIAL NON-DETRIMENTAL TO THE REINFORCING STEEL.
5. PERMANENT CASINGS WILL NEW OR SECONDARY PIPE STEEL AND SHALL BE SMOOTH STEEL CYLINDERS HAVING AN OUTSIDE DIAMETER REQUIRED FOR THE SPECIFIED DIAMETER OF THE DRILLED MICROPILE AND HAVING A WALL THICKNESS REQUIRED FOR THE SPECIFIED DIAMETER. PERMANENT STEEL CASING SHALL MEET THE TENSILE REQUIREMENTS OF GRADE API N80 WITH MINIMUM YIELD STRENGTH OF 80 KSI. PERMANENT STEEL CASING SHALL HAVE SPECIAL HIGH-STRENGTH MACHINED FLUSH JOINT THREADS TO JOIN THE PIPE SECTIONS. INTERNAL FLUSH-COUPLE THREADED JOINTS SHALL DEVELOP AT LEAST 50% OF THE ULTIMATE REQUIRED NOMINAL STRENGTH AND RESISTANCE OF A SOLID PIPE.
6. REINFORCING BARS SHALL BE NEW STEEL REINFORCING BARS CONFORMING TO ASTM A615, GRADE 75, EPOXY-COATED IN ACCORDANCE WITH ASTM A775, WITH SIZES AS SHOWN ON THE DRAWINGS.
7. WHEN A BEARING PLATE AND NUT ARE REQUIRED TO BE THREADED ONTO THE TOP END OF REINFORCING BARS FOR THE PILE TOP TO FOOTING ANCHORAGE, THE THREADING MAY BE CONTINUOUS SPIRAL DEFORMED RIBBING PROVIDED BY THE BAR DEFORMATIONS. THE COUPLING SYSTEM SHALL BE CAPABLE OF DEVELOPING THE FULL DESIGN LOADING SPECIFIED AND HAVE AN ULTIMATE STRENGTH NO LESS THAN THE THREAD BAR.
8. ALL PLATES, HEX NUTS, WASHERS, THREADED BAR CONNECTORS AND/OR COUPLING SYSTEMS SHALL BE COMPATIBLE WITH THE THREADED REINFORCEMENT USED FOR THE MICROPILES, AND SHALL BE EPOXY-COATED.
9. THE GROUT WITH A WATER TO CEMENT RATIO NO GREATER THAN 0.5 SHALL BE CAPABLE OF DEVELOPING THE REQUIRED LOAD CAPACITIES AND SHALL CONSIST OF A NEAT CEMENT-WATER MIX WITH A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 3,500 PSI AND A 28-DAY COMPRESSIVE STRENGTH OF 5,000 PSI.

V. EXECUTION

1. ALL MICROPILES SHALL BE DRILLED TO THE DEPTHS AS REQUIRED. THE DRAWINGS SHOW ESTIMATED DEPTHS TO WHICH HOLES SHALL BE DRILLED TO OBTAIN REQUIRED PENETRATION AND SUITABLE BOND IN BEDROCK.
2. ALL INSTALLATION TECHNIQUES SHALL BE DETERMINED AND SCHEDULED SUCH THAT THERE WILL BE NO INTERCONNECTION OR DAMAGE TO PILES IN WHICH GROUT HAS NOT ACHIEVED FINAL SET.
3. MICROPILE DRILLING SHALL BE EXECUTED BY COMPRESSED AIR OR COMPRESSED AIR/WATER ROTARY PERCUSSION DRILLING METHODS USING DUPLEX, NUMA STYLE, OR OTHER APPROVED DRILLING METHODS THAT CAN ADVANCE A ROCK SOCKET HAVING A DIAMETER NO LESS THAN THE INSIDE DIAMETER OF THE STEEL PIPE CASING LESS 1/4 INCH. CONTRACTOR REQUIRED TO CONTROL CUTTINGS AND SPRAY. USE OF REVERSE CIRCULATION DOWN-THE-HOLE HAMMERS WILL BE PERMITTED. MANAGEMENT AND CONTROL OF DRILLING SOLIDS, SPOILS, AND FLUIDS SHALL BE PROVIDED TO PREVENT SPILLS ONTO USACE PROPERTY AND THE HUDSON RIVER. (2)
4. CENTRALIZERS SHALL BE PROVIDED AT 10-FT MAXIMUM VERTICAL SPACING ON CENTRAL REINFORCEMENT. THE UPPERMOST CENTRALIZER SHALL BE LOCATED A MAXIMUM OF 5 FEET FROM THE TOP OF THE MICROPILE.
5. THE CENTRAL REINFORCEMENT STEEL WITH CENTRALIZERS SHALL BE LOWERED INTO THE STABILIZED DRILL HOLES TO THE DESIRED DEPTH WITHOUT DIFFICULTY. PARTIALLY INSERTED REINFORCING BARS SHALL NOT BE DRIVEN OR FORCED INTO THE HOLE.
6. PLACEMENT OF GROUT IN A DRILLED HOLE SHALL NOT PROCEED UNTIL APPROVAL FOR PLACEMENT IS GIVEN BY THE ENGINEER. APPROVAL FOR GROUTING WILL NOT BE GIVEN UNTIL THE HOLE IS FREE FROM ACCUMULATIONS OF LOOSE MATERIAL, APPROVED REINFORCING IS IN PLACE IN THE HOLE AND PROPERLY POSITIONED, AND ACCURATE PLAN LOCATION AND VERTICAL ALIGNMENT HAS BEEN VERIFIED. THE TREMIE PIPE SHALL MAINTAIN EMBEDDED A MINIMUM OF 5 FEET BELOW THE TOP OF THE GROUT AT ALL TIMES DURING GROUTING. (2)
7. THE GROUTING EQUIPMENT USED SHALL PRODUCE A GROUT FREE OF LUMPS AND UNDISPERSED CEMENT. GROUT SHALL BE PLACED WITHIN 1.5 HOURS OF MIXING. ONCE COMMENCED, GROUT PLACEMENT FOR EACH MICROPILE SHALL BE CARRIED THROUGH TO COMPLETION AT A RATE AND WITH A CONTINUITY THAT RESULTS IN NO COLD JOINTS. THE GROUT SHALL BE INJECTED FROM THE LOWEST POINT OF THE DRILL HOLE AND INJECTION SHALL CONTINUE UNTIL UNCONTAMINATED GROUT FLOWS FROM THE TOP OF THE MICROPILE.
8. PERFORM ONE VERIFICATION TENSION LOAD TEST. INSTALL ONE SACRIFICIAL VERTICAL MICROPILE AT A LOCATION SELECTED BY THE ENGINEER. USE THE SAME MATERIALS, EQUIPMENT, AND PROCEDURES AS WILL BE USED FOR THE PRODUCTION PILES. THE VERIFICATION TEST PILE SHALL BE LOAD TESTED TO A MINIMUM OF 430 KIPS (215 TONS), WHICH IS TWO TIMES THE ALLOWABLE DESIGN LOAD OF THE TENSION MICROPILES.
9. PERFORM ONE VERIFICATION COMPRESSION LOAD TEST. INSTALL ONE SACRIFICIAL VERTICAL MICROPILE AT A LOCATION SELECTED BY THE ENGINEER. USE THE SAME MATERIALS, EQUIPMENT, AND PROCEDURES AS WILL BE USED FOR THE PRODUCTION PILES. THE VERIFICATION TEST PILE SHALL BE LOAD TESTED TO A MINIMUM OF 800 KIPS (400 TONS), WHICH IS TWO TIMES THE ALLOWABLE DESIGN LOAD OF THE COMPRESSION MICROPILES.
10. LOAD TEST PILES TO TWICE THE ANTICIPATED WORKING LOAD UNLESS FAILURE OCCURS FIRST. COMPRESSION PILE LOAD TEST ACCEPTANCE SHALL BE GOVERNED BY THE DAVISSON OFFSET CRITERIA. DURING THE COMPRESSION TEST, THE PILE SETTLEMENT SHALL BE LESS THAN PL/AE + 0.15" + D/120, WHERE D=9.625" AT TWICE THE DESIGN LOAD LISTED IN THE CONTRACT DOCUMENTS. TENSION PILE ACCEPTANCE SHALL BE GOVERNED BY THE DAVISSON OFFSET CRITERIA. DURING THE TENSION TEST, THE PILE EXTENSION SHALL BE LESS THAN PL/AE + 0.15" ASSUMING COMPOSITE ACTION AT TWICE THE DESIGN LOAD LISTED IN THE CONTRACT DOCUMENTS. (2)

W. GROUT TESTING

1. AN INDEPENDENT TESTING AGENCY SHALL BE RETAINED ON SITE TO MEASURE GROUT DENSITY AND COLLECT CYLINDERS (MIN. OF 5) FOR CURING AND TESTING. TEST TWO CYLINDERS AT 7 AND 28 DAYS AND KEEP ONE IN RESERVE

RELIEVING PLATFORM LOAD RATING

X. GENERAL

1. THE PILE-SUPPORTED REINFORCED CONCRETE RELIEVING PLATFORM SHOWN ON THE DRAWINGS WAS DESIGNED FOR EQUIPMENT LOADS EXPECTED DURING CONSTRUCTION. SPECIFICALLY, THE FOLLOWING TWO EQUIPMENT LOADS WERE CONSIDERED IN DESIGN:
   - 1.1. BAUER BG-40 DRILL RIG. IT IS ANTICIPATED THAT THIS DRILL RIG OR A SIMILAR MODEL WILL BE USED TO INSTALL THE SECANT PILES. THE RELIEVING PLATFORM WAS DESIGNED FOR A STATIC RIG WEIGHT OF 333,000 POUNDS PLUS A CROWD FORCE OR WINCH PULL OF 103,000 POUNDS, FOR A TOTAL VERTICAL LOAD OF 436,000 POUNDS. THE LOAD WAS DISTRIBUTED OVER 16-FOOT-LONG, 3.3-FOOT-WIDE TRACKS AT AN OUT-TO-OUT SPACING OF 12 FEET, WITH A WORST-CASE ECCENTRICITY EQUAL TO ONE QUARTER OF THE TRACK FOOTPRINT DIMENSIONS FROM THE CENTERLINE OF THE UNDERCARRIAGE.
   - 1.2. LIEBHERR LR 1200 CRAWLER CRANE. IT IS ANTICIPATED THAT THIS CRANE OR A SIMILAR MODEL WILL BE USED FOR DREDGING. THE RELIEVING PLATFORM WAS DESIGNED FOR A TOTAL CRANE WEIGHT OF 516,000 POUNDS, INCLUDING THE LOAD (LINE PULL FORCE). THE WEIGHT WAS DISTRIBUTED OVER 20-FOOT-LONG, 3.3-FOOT-WIDE TRACKS AT AN OUT-TO-OUT SPACING OF 22 FEET, WITH A WORST-CASE ECCENTRICITY OF 2.81 FEET FROM THE CENTERLINE OF THE UNDERCARRIAGE.
2. THE RELIEVING PLATFORM AND PILES WERE DESIGNED FOR THESE EQUIPMENT LOADS AT ANY LOCATION, AT ANY TRACK ORIENTATION, WITH ANY SUPERSTRUCTURE SLEW ANGLE, PROVIDED THAT THE TRACKS ARE FULLY ON THE PLATFORM (NOT OVERHANGING).
3. NO PLATES, MATS, OR OTHER DUNNAGE ARE NEEDED, EXCEPT AS REQUIRED TO PROTECT THE CONCRETE FROM SURFACE DAMAGE.
4. THE RELIEVING PLATFORM WAS NOT DESIGNED FOR SIMULTANEOUS LOADS FROM THE HEAVY TRACKED EQUIPMENT AND ANY BACKFILL; THE BACKFILL MUST BE PLACED AFTER THE EQUIPMENT HAS COMPLETED WORK AND BEEN MOVED OFF OF THE PLATFORM.
5. THE SECANT PILES AND CAP BEAM WERE NOT SPECIFICALLY DESIGNED FOR EQUIPMENT LOADS.
6. CONTRACTOR PROPOSALS TO USE A BG-40 OR LR 1200 WITHIN THE OPERATING LIMITS DESCRIBED ABOVE ARE PRESUMED TO BE WITHIN THE LOAD CAPACITY OF THE RELIEVING PLATFORM AND PILES. CONTRACTOR PROPOSALS TO USE OTHER EQUIPMENT WILL BE CONSIDERED TO BE WITHIN THE LOAD CAPACITY PROVIDED THAT ALL OF THE FOLLOWING COMPARISONS TO THE EITHER THE BG-40 OR THE LR 1200, AS USED IN THE DESIGN, ARE MET:
   - 6.1. THE SAME OR SMALLER TOTAL WEIGHT, INCLUDING CROWD, PULL, ETC.
   - 6.2. THE SAME OR SMALLER ECCENTRICITY.
   - 6.3. THE SAME OR LARGER TRACK SIZE.
   - 6.4. THE SAME OR LARGER OUT-TO-OUT TRACK DIMENSIONS.
7. CONTRACTOR PROPOSALS TO USE EQUIPMENT THAT DOES NOT MEET THESE CRITERIA MUST BE SUPPORTED BY AN ENGINEERING ANALYSIS OF THE RELIEVING PLATFORM AND PILES. THIS ANALYSIS MUST CONSIDER ALL RELEVANT LOADS AND MUST BE REVIEWED AND APPROVED BY THE ENGINEER AND OWNER.

IN CASE OF A CONFLICT BETWEEN THESE NOTES AND THE PROJECT TECHNICAL SPECIFICATIONS, THE TECHNICAL SPECIFICATIONS SHALL HAVE PRECEDENCE.

FOR BID

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
2	08/25/2014	ADD. 5 - REVISE MICROPILE NOTES	WHW
1	08/04/2014	ADDENDUM 1 - ADD LOAD RATING NOTES	WHW
0	06/13/2014	FOR BID	WHW

STATE OF NEW YORK · WILLIAM H. WALTON · 086268 · LICENSED PROFESSIONAL ENGINEER

Designed:	CKT
Checked:	JTF
Drawn:	DTE
Submitted By:	WHW
NY P.E. No.:	86268
Submittal Date:	06/13/2014

GEI Consultants Inc., P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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nationalgrid

GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

STRUCTURAL NOTES

DWG. NO. S9

SHEET NO. 29 of 35

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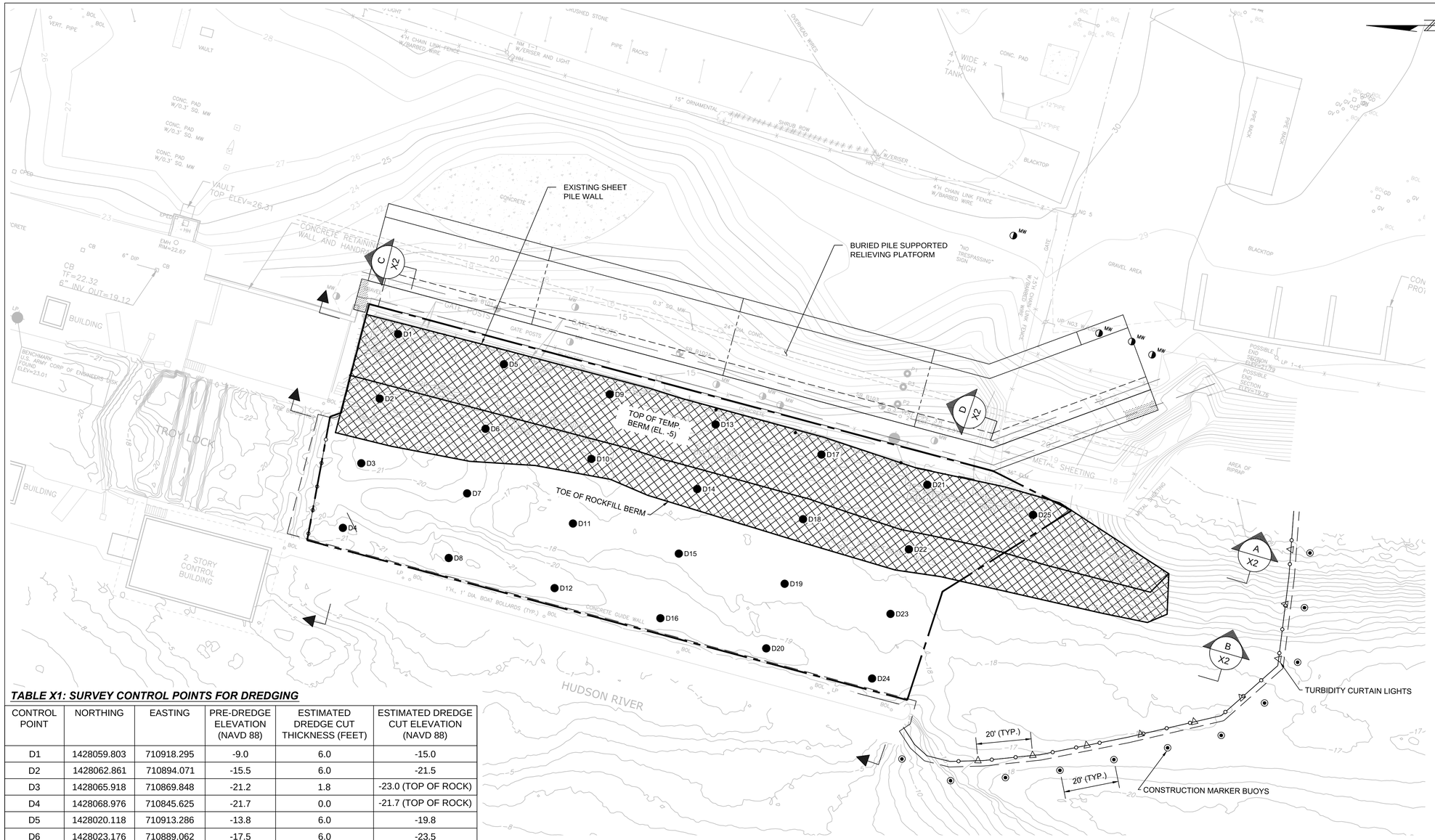

PLAN VIEW

0 20 40

SCALE, FEET

LEGEND:

- LIMIT OF AQUATIC WORK
- FIXED TURBIDITY CURTAIN FOR DREDGING AND FILLING (WITH ABSORBANT BOOM)
- EXTENT OF DREDGE AREA
- TEMPORARY ROCK BERM
- EXISTING CLEAT
- UPLAND
- TURBIDITY CURTAIN LIGHTS
- CONSTRUCTION MARKER BUOYS

NOTES:

1. BASEMAP ADAPTED FROM TETRA TECH PLAN TITLED "MULTIBEAM HYDROGRAPHY SOUTH ENTRANCE OF TROY LOCK, HUDSON RIVER, TROY, NEW YORK", DATED 8-2-11.
2. SEDIMENT ELEVATIONS ARE IN FEET AND ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88) BASED ON BENCHMARK "SOUTH POINT" HAVING AN ELEVATION OF 23.858 FEET NAVD 88 PER OPUS OBSERVATIONS MADE BY OCEAN SURVEYS, INC. DEPTHS WERE DEVELOPED FROM ONE FOOT BY ONE FOOT BINNED DATA WITH THE AVERAGE ELEVATION WITHIN EACH BIN POSTED IN THE CENTER OF THE BIN.
3. SEDIMENT CONTOURS ARE IN FEET AND WERE GENERATED USING "QUICKSURF" OPERATING WITHIN AUTODESK "AUTOCAD".
4. PREPARE A PRE-DREDGE BATHYMETRIC SURVEY PRIOR TO BEGINNING DREDGING OPERATION.
5. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2011 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
6. THE TOP OF SEDIMENT ELEVATION INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A MULTIBEAM SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON THE 9TH TO THE 11TH OF MAY 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. GRID SYSTEM IS THE NEW YORK EAST STATE PLANE COORDINATE SYSTEM, NAD 83.
7. TEMPORARY ROCK BERM AND SHEETPILE WALL TO BE REMOVED PRIOR TO THE START OF DREDGING. SEE PLAN C3 FOR SEQUENCE OF ACTIVITIES.
8. TURBIDITY CONTROLS TO BE IN PLACE DURING REMOVAL OF THE SHEETPILE WALL AND REMOVAL OF THE TEMPORARY ROCK BERM.
9. AN ADDITIONAL TURBIDITY CURTAIN AND ABSORBENT BOOM TO BE PLACED IMMEDIATELY AROUND THE ACTIVE AREA DURING SEDIMENT REMOVAL AND FILLING ACTIVITIES. SEE PLAN X5 FOR DETAILS.
10. SEE SHEET C2 FOR LOCATION AND DETAILS OF THE LINED DEWATERING AND STAGING PAD.
11. SEE NOTES ON SHEET G2.
12. PROVIDE WARNING BUOYS FOR GAS MAIN PROTECTION, AS SHOWN IN DRAWING X3.
13. THE PRE-DREDGE ELEVATIONS AND ESTIMATED DREDGE CUT ELEVATIONS IN TABLE X1 WERE BASED ON THE MAY, 2012 BATHYMETRIC SURVEY AND ARE PROVIDED FOR BIDDING PURPOSES ONLY. THE ACTUAL BATHYMETRIC SURVEY AND FINAL DREDGE CUT ELEVATIONS FOR CONSTRUCTION WILL BE BASED ON THE PRE-DREDGE BATHYMETRIC SURVEY TO BE CONDUCTED BY THE CONTRACTOR.

TABLE X1: SURVEY CONTROL POINTS FOR DREDGING

CONTROL POINT	NORTHING	EASTING	PRE-DREDGE ELEVATION (NAVD 88)	ESTIMATED DREDGE CUT THICKNESS (FEET)	ESTIMATED DREDGE CUT ELEVATION (NAVD 88)
D1	1428059.803	710918.295	-9.0	6.0	-15.0
D2	1428062.861	710894.071	-15.5	6.0	-21.5
D3	1428065.918	710869.848	-21.2	1.8	-23.0 (TOP OF ROCK)
D4	1428068.976	710845.625	-21.7	0.0	-21.7 (TOP OF ROCK)
D5	1428020.118	710913.286	-13.8	6.0	-19.8
D6	1428023.176	710889.062	-17.5	6.0	-23.5
D7	1428026.233	710864.839	-19.0	3.9	-22.9 (TOP OF ROCK)
D8	1428029.291	710840.615	-22.0	0.0	-22.0 (TOP OF ROCK)
D9	1427980.433	710908.276	-13.3	6.0	-19.3
D10	1427983.491	710884.053	-15.0	6.0	-21.0
D11	1427986.548	710859.830	-17.4	5.4	-22.8 (TOP OF ROCK)
D12	1427989.606	710835.606	-20.6	0.4	-21.0 (TOP OF ROCK)
D13	1427940.748	710903.267	-15.0	6.0	-21.0
D14	1427943.805	710879.044	-16.6	6.0	-22.6
D15	1427946.863	710854.821	-17.7	5.3	-23.0 (TOP OF ROCK)
D16	1427949.921	710830.597	-19.3	1.7	-21.0 (TOP OF ROCK)
D17	1427901.063	710898.258	-14.6	6.0	-20.6
D18	1427904.120	710874.035	-16.9	6.0	-22.9
D19	1427907.178	710849.811	-17.8	6.0	-23.8
D20	1427910.235	710825.588	-19.1	6.0	-25.1
D21	1427861.378	710893.249	-13.9	6.0	-19.9
D22	1427864.435	710869.026	-16.1	6.0	-22.1
D23	1427867.493	710844.802	-17.5	6.0	-23.5
D24	1427870.550	710820.579	-18.2	6.0	-24.2
D25	1427821.693	710888.240	-12.8	6.0	-18.8

FOR BID

Attention:

0 1"

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NO.	DATE	ISSUE/REVISION	APP
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

Designed: *BEC*
Checked: *LJW*
Drawn: *DTE*
Submitted By: *JTF*
NY P.E. No.: *73034*
Submittal Date: 06/13/2014

GEI Consultants Inc. PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

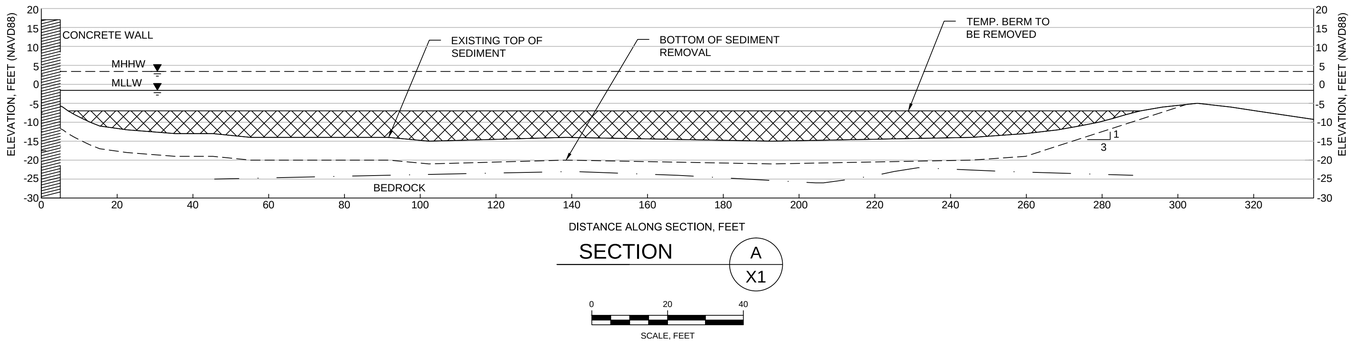
GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

SHEET PILE CUT OFF AND DREDGING PLAN

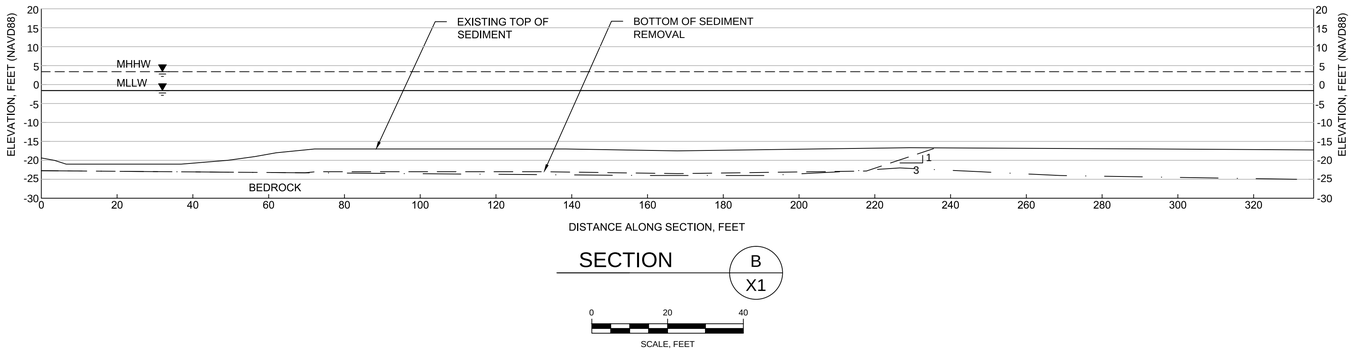
DWG. NO. X1

SHEET NO. 30 of 35



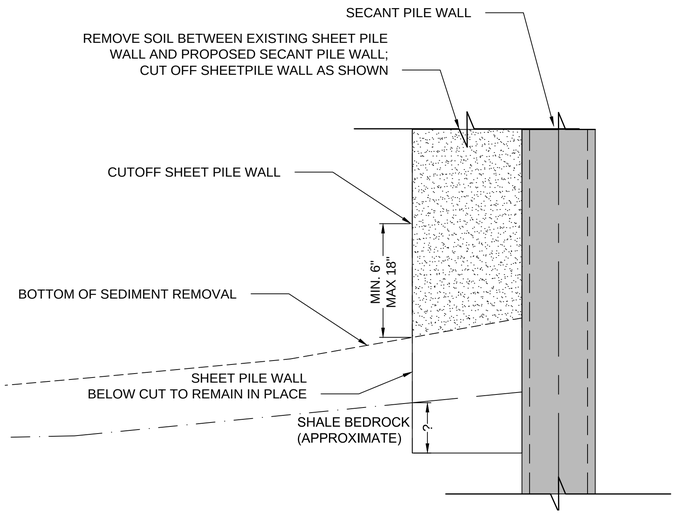
SECTION A / X1

SCALE, FEET



SECTION B / X1

SCALE, FEET



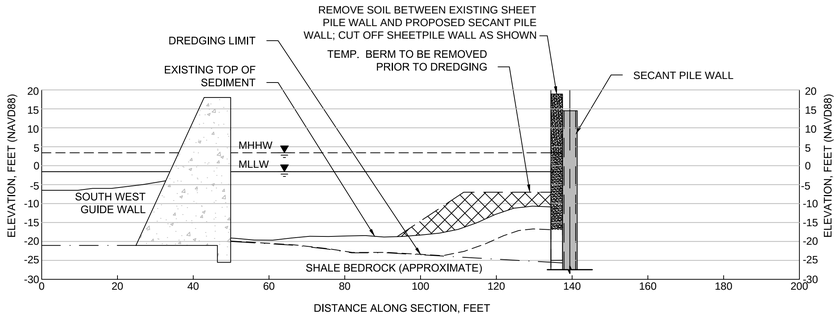
DETAIL / SHEET PILE WALL REMOVAL — 1 / -

LEGEND:

- BOTTOM OF SEDIMENT REMOVAL
- APPROXIMATE TOP OF BEDROCK
- SEDIMENT SURFACE - BATHYMETRIC SURVEY
- MEAN HIGHER-HIGH WATER
- MEAN LOWER-LOW WATER
- TEMPORARY ROCK BERM

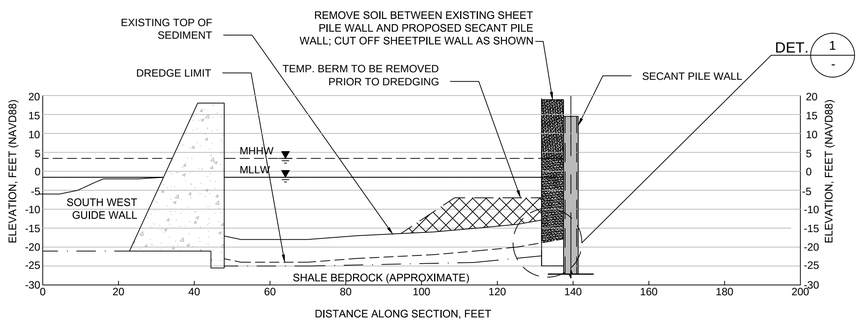
NOTES:

1. THE DEPTH OF EMBEDMENT OF SHEET PILE WALL INTO BEDROCK IS UNKNOWN.
2. SEE NOTES ON SHEET X1.
3. TEMPORARY ROCK BERM AND SHEETPILE WALL TO BE REMOVED PRIOR TO THE START OF DREDGING. SEE PLAN C3 FOR SEQUENCE OF ACTIVITIES.
4. ALL TOPOGRAPHY SHOWN IN CROSS-SECTIONS IS GENERALIZED INFORMATION.
5. BEDROCK ELEVATIONS ARE ESTIMATED AND MAY VARY SIGNIFICANTLY FROM WHAT IS SHOWN.



SECTION C / X1

SCALE, FEET



SECTION D / X1

SCALE, FEET

FOR BID

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STATE OF NEW YORK — JOHN T. FINN — 073034 — LICENSED PROFESSIONAL ENGINEER

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Checked: *LJW*
Drawn: *DTE*
Submitted By: *JTF*
NY P.E. No.: *73034*
Submittal Date: 06/13/2014

GEI Consultants Inc. P.C.
1301 Trumansburg Road
Ithaca, New York
607-216-8955

nationalgrid

GEI Project 116830

Troy-Smith Avenue Former MGP Site
Operable Units No. 1 and 3

SHEET PILE CUT OFF AND DREDGING PLAN SECTIONS

DWG. NO. X2

SHEET NO. 31 of 35

LEGEND:

- LIMIT OF AQUATIC WORK
- FIXED TURBIDITY CURTAIN FOR DREDGING AND FILLING (WITH ABSORBENT BOOM)
- AQUATIC BACKFILL AREA
- -5 PROPOSED CONTOUR
- TURBIDITY CURTAIN LIGHTS
- CONSTRUCTION MARKER BUOYS
- GAS MAIN WARNING BUOYS

NOTES:

1. SEE NOTES ON SHEET X1.
2. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2011 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
3. AT THE COMPLETION OF DREDGING, BACKFILL THE DREDGED AREA WITH 2 FEET OF AQUATIC FILL.
4. BACKFILLED CONTOUR LINES ARE APPROXIMATE, AND WILL DEPEND ON FINAL DREDGING ELEVATIONS.

APPROXIMATE LOCATION OF GAS MAINS

WARNING BUOY (TYP)

TURBIDITY CURTAIN LIGHTS

20' (TYP.)

20' (TYP.)

CONSTRUCTION MARKER BUOYS

C X4

D X4

A X4

B X4

VAULT TOP ELEV=26.81

CB TF=22.32 6" INV. OUT=19.12

BENCHMARK U.S. ARMY CORP OF ENGINEERS DISK FOUND ELEV=23.01

TROY LOCK

2 STORY CONTROL BUILDING

BUILDING

HUDSON RIVER

CONCRETE PROTECTION BARRIER

PLAN VIEW

0 20 40

SCALE, FEET

FOR BID

NO.	DATE	ISSUE/REVISION	APP
1	08/25/2014	ADD. 5 - UPDATE SITE CONTOURS	JTF
0	06/13/2014	FOR BID	JTF

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STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

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GEI Consultants Inc., PC
1301 Trumansburg Road
Ithaca, New York
607-216-8955

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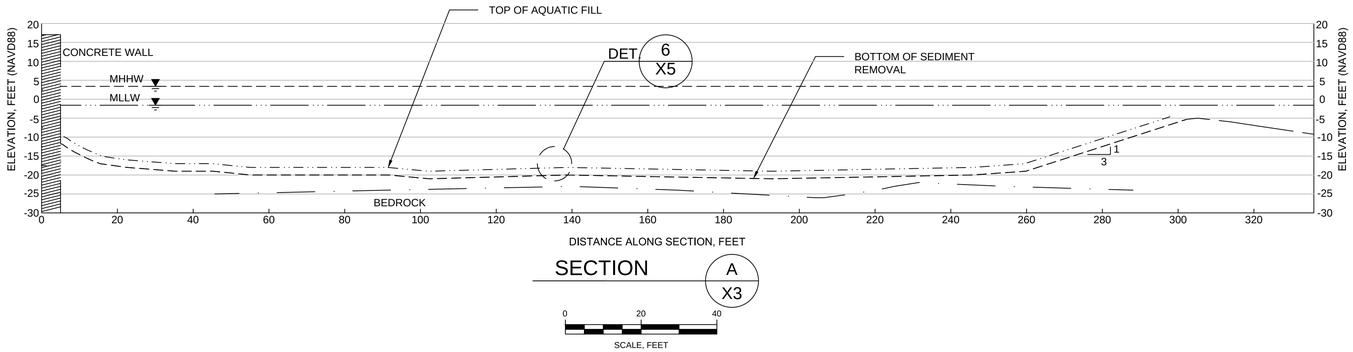
Operable Units No. 1 and 3

AQUATIC FILLING PLAN

DWG. NO. X3

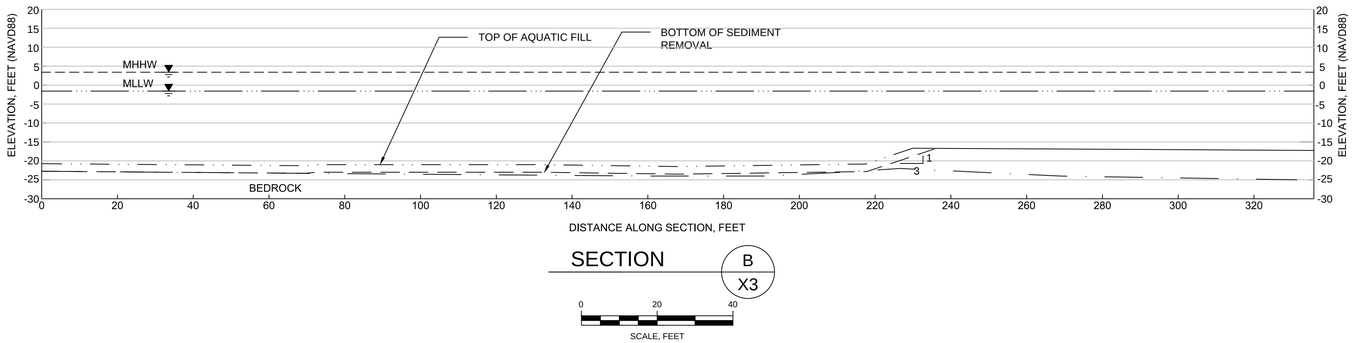
SHEET NO. 32 of 35



SECTION A X3

0 20 40

SCALE, FEET



SECTION B X3

0 20 40

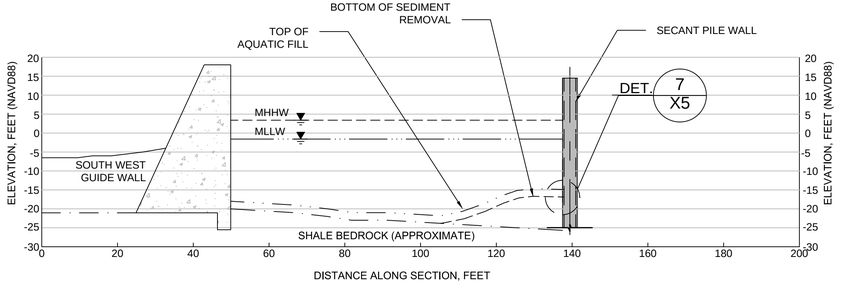
SCALE, FEET

LEGEND:

- BOTTOM OF SEDIMENT REMOVAL
- APPROXIMATE TOP OF BEDROCK
- AQUATIC FILLING LINE
- SEDIMENT SURFACE - BATHYMETRIC SURVEY
- MEAN HIGH WATER
- MEAN LOW WATER

NOTES:

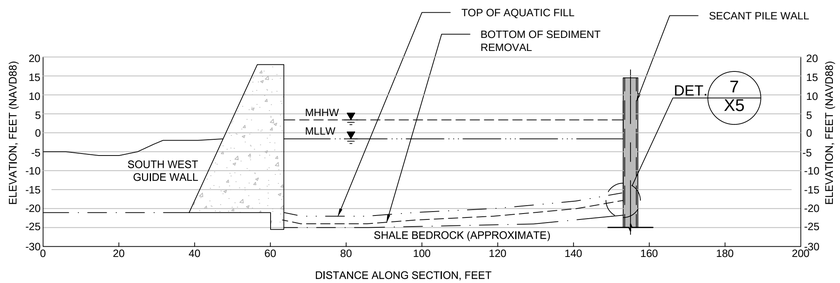
1. SEE NOTES ON SHEET X1.
2. ALL TOPOGRAPHY SHOWN IN CROSS SECTIONS IS GENERALIZED INFORMATION.
3. AT THE COMPLETION OF DREDGING, BACKFILL THE DREDGED AREA WITH 2 FEET OF AQUATIC FILL.
4. BEDROCK ELEVATIONS ARE ESTIMATED AND MAY VARY SIGNIFICANTLY FROM WHAT IS SHOWN HERE.



SECTION C X3

0 20 40

SCALE, FEET



SECTION D X3

0 20 40

SCALE, FEET

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Attention:

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STATE OF NEW YORK JOHN T. FINN 073034 LICENSED PROFESSIONAL ENGINEER

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GEI Consultants Inc, PC
1301 Trumansburg Road
Ithaca, New York
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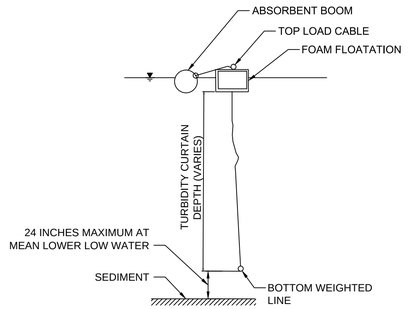
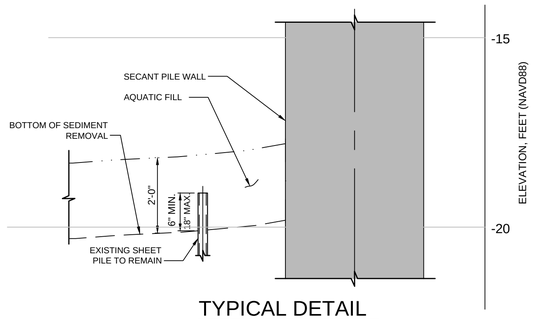
AQUATIC FILLING SECTIONS

DWG. NO. X4

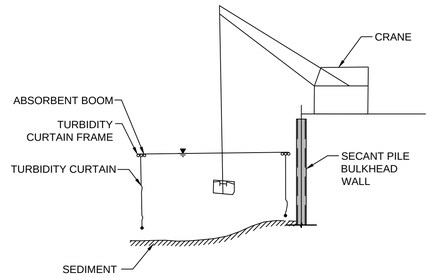
SHEET NO. 33 of 35



TYPICAL SECTION
TURBIDITY CURTAIN



TYPICAL DETAIL
FILL PLACEMENT



TYPICAL DETAIL
CONCEPTUAL DREDGING CONTAINMENT

0 2 4
SCALE, FEET

NOTES:

1. THE BOTTOM EDGE OF THE TURBIDITY CURTAIN MUST BE WEIGHTED AND ALLOW FOR BETWEEN 12 AND 24 INCHES OF CLEARANCE ABOVE THE SEDIMENT SURFACE AT MEAN LOWER LOW WATER.
2. TURBIDITY CURTAIN: MIDDLE WEIGHT TURBIDITY CURTAIN 18OZ./SQUARE YARD.
3. ABSORBENT BOOM: GN-A-4MB, GREEN 5"x10'.

FOR BID

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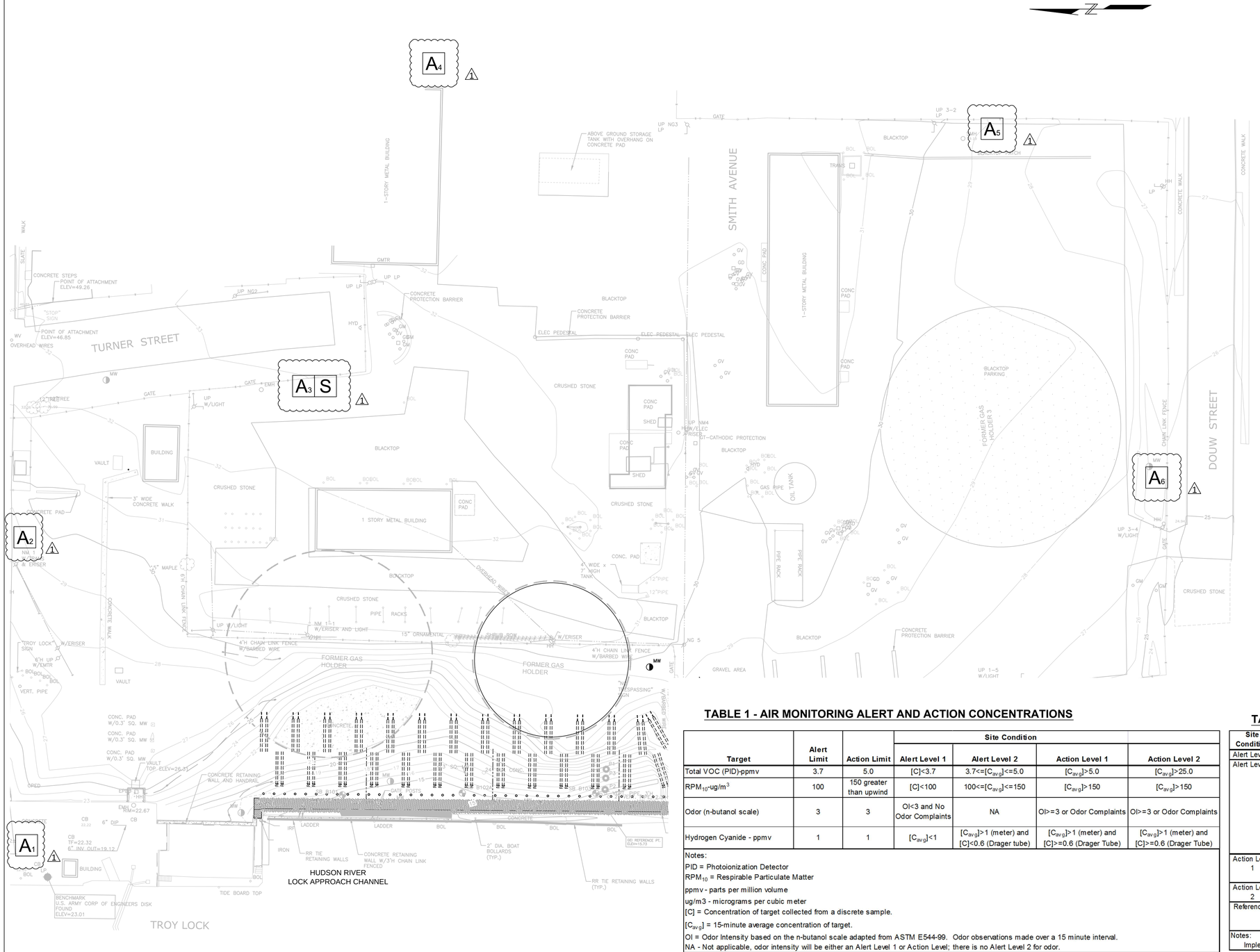
DREDGE AND FILL DETAILS

DWG. NO. X5

SHEET NO. 34 of 35



⚠1 COMMUNITY AIR MONITORING LEGEND:

- A5 — AIR MONITORING STATION
- S — METEOROLOGICAL STATION

A. AIR MONITORING NOTES:

1. AIR MONITORING WILL BE PERFORMED BY OTHERS. SEE REMEDIAL ACTION WORK PLAN FOR DESCRIPTION OF PERIMETER AIR MONITORING PROGRAM.
2. COORDINATE EQUIPMENT POWER NEEDS WITH OWNER.
3. PROTECT AIR MONITORING AND METEOROLOGICAL EQUIPMENT PROVIDED BY ENGINEER.
4. CEASE WORK UNDER ACTION LEVEL CONDITIONS IN TABLE 2. ENGINEER WILL COORDINATE A MEETING WITHIN 60 MINUTES OF THE ACTION LEVEL NOTIFICATION. WITH NATIONAL GRID, NYSDEC, AND/OR NYSDOH REPRESENTATIVES TO DETERMINE APPROPRIATE RESPONSE ACTIONS.
5. ADJUST CONSTRUCTION TO COMPLY WITH ALERT AND ACTION LEVELS IN TABLE 3.

B. AIR MONITORING LOCATION NOTES:

1. LOCATIONS SHOWN ARE CONCEPTUAL.
2. ENGINEER TO LOCATE AIR MONITORING STATIONS BASED ON WIND DIRECTION AND SPEED.
3. ENGINEER TO LOCATE AIR MONITORING STATIONS OUTSIDE PROJECT LIMITS.

TABLE 1 - AIR MONITORING ALERT AND ACTION CONCENTRATIONS

Target	Alert Limit	Action Limit	Site Condition			
			Alert Level 1	Alert Level 2	Action Level 1	Action Level 2
Total VOC (PID)-ppmv	3.7	5.0	[C]<3.7	3.7<=[C_{avg}]<=5.0	[C_{avg}]>5.0	[C_{avg}]>25.0
RPM_{10}-ug/m^3	100	150 greater than upwind	[C]<100	100<=[C_{avg}]<=150	[C_{avg}]>150	[C_{avg}]>150
Odor (n-butanol scale)	3	3	OI<3 and No Odor Complaints	NA	OI>=3 or Odor Complaints	OI>=3 or Odor Complaints
Hydrogen Cyanide - ppmv	1	1	[C_{avg}]<1	[C_{avg}]>1 (meter) and [C]<0.6 (Drager tube)	[C_{avg}]>1 (meter) and [C]>=0.6 (Drager Tube)	[C_{avg}]>1 (meter) and [C]>=0.6 (Drager Tube)

Notes:
PID = Photoionization Detector
RPM_{10} = Respirable Particulate Matter
ppmv - parts per million volume
ug/m3 - micrograms per cubic meter
[C] = Concentration of target collected from a discrete sample.
[C_{avg}] = 15-minute average concentration of target.
OI = Odor Intensity based on the n-butanol scale adapted from ASTM E544-99. Odor observations made over a 15 minute interval.
NA - Not applicable, odor intensity will be either an Alert Level 1 or Action Level; there is no Alert Level 2 for odor.

TABLE 2 - AIR MONITORING RESPONSE ACTIONS

Site Condition	Response Action
Alert Level 1	▪ Normal site operations – no response action required
Alert Level 2	▪ Establish trend of data and determine if evaluation/wait period is warranted ▪ Temporarily stop work ▪ Temporarily relocate work to an area with potentially lower emission levels ▪ Apply water to area of activity or haul roads to minimize dust levels ▪ Reschedule work activities ▪ Cover all or part of the excavation area ▪ Apply VOC emission suppressant foam over open excavation areas ▪ Slow the pace of construction activities ▪ Change construction process or equipment that minimize air emissions ▪ Install a perimeter barrier fence
Action Level 1	▪ Encapsulate construction area and treat air exhaust ▪ Perform work during cold weather ▪ Halt construction activities
Action Level 2	▪ Stop Work ▪ Re-evaluate activities
References:	▪ NYSDOH Community Air Monitoring Plan, December 2009, as published in NYSDEC DER-10, Appendix 1A, 2010. ▪ Fugitive Dust and Particulate Monitoring, NYSDEC DER-10, Appendix 1B, 2010. ▪ Hspecial Requiements for Work Within 20 Feeet of Potentially Exposed Individuals or Structures, NYSDOH.

Notes:
Implement response actions within an Alert Level in an order that is most appropriate.

PLAN

0 30 60
SCALE, FEET

FOR BID

Attention:

0 1"
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NO.	DATE	ISSUE/REVISION	APP
1	06/27/2014	UPDATE STATION NUMBERS	JTF
0	06/13/2014	FOR BID	JTF

STATE OF NEW YORK · JOHN T. FINN · 073034 · LICENSED PROFESSIONAL ENGINEER

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COMMUNITY AIR MONITORING PROGRAM

DWG. NO. X6

SHEET NO. 35 of 35